KNOWLEDGE, ATTITUDES AND INFECTION CONTROL PRACTICES OF ORAL HEALTH STUDENTS WHEN MANAGING PATIENTS WITH HIV/AIDS IN JOHANNESBURG, SOUTH AFRICA

Zorayda .M.S Joosab

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DECLARATION

I, **Zorayda M.S Joosab**, declare that this research report is my own, unaided work. It is being submitted for the Degree of Master of Community Dentistry at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

.....[Signature of Candidate]

.....day of .....[Month] 2016

DEDICATION

I dedicate this work to:

My one and only form of support, my husband and best friend, Mohammed Ismail, my beloved son, Raiyan Ismail and my special baby girl, Madeeha Ismail.

ABSTRACT

Oral care for patients with HIV/AIDS plays a vital role in improving their nutritional intake, medication tolerance and effectiveness, treatment success rate, as well as quality of life. As the number of people living with HIV/AIDS increases, the possibility of oral healthcare professionals treating more patients with HIV/AIDS will increase and this will result in an increased risk of cross contamination in the dental setting. **Aim** was to determine the knowledge, attitude and infection control practices of undergraduate dental and oral hygiene students when managing patients with HIV/AIDS. This KAP survey was of a cross-sectional design with an analytical component conducted among 108 dental and oral hygiene students. A validated questionnaire was utilized as a study instrument of choice. A convenience sampling technique was utilized and all students in the target population formed the study sample. **Results:** The study sample had a mean age of 21 (20 - 23) years, with the majority being females 82 (75.93%) as opposed to 26 (24.07%) males. The average knowledge level of students regarding HIV/AIDS was approximately 55% with a standard deviation of 0.15; the median was 0.55 with a min-max value of (0.2-1.0). [Table2]. Twenty nine per cent of the students (31) had a moderate knowledge level regarding the management of HIV/AIDS patients. Just over half of the cohort, 60(55.56%) of the students had a positive attitude, 44(40.74%) had a passive attitude and 4(3.70%) students had a negative attitude. The infection control practices were of a good quality among the clinical students, with an average of 78.87% (std: 15.61%). Three quarters 53 (76%) of these students had good infection control practice and 17(24%) students had excellent infection control practices. **Conclusion**: The dental curriculum needs to be appropriately modified, existing learning activities and practical skills should be adapted to ensure future dental practitioners have the clinical competence, in combination with relevant knowledge to provide excellent and appropriate care to patients with HIV/AIDS or any other common transmissible diseases.

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ABBREVIATIONS AND ACRONYMS

AIDS:	Acquired Immune-deficiency Syndrome
ARV:	Antiretroviral
CDC :	Centres for Disease Control and Prevention
CPR:	Cardio-Pulmonary Resuscitation
DCP:	Dental Care Providers
DOH:	Department of Health
HAART:	Highly Active Antiretroviral Therapy
HIV:	Human Immune-deficiency Virus
HPCSA:	Health Professions Council of South Africa
KAP:	Knowledge, Attitudes and Practices Survey
OH :	Oral Hygiene
OHCW:	Oral Health Care Workers
TCOHC:	Trained Caregivers in Oral Health Care
UNAIDS:	Joint United Nations Programme on HIV/AIDS
WHO:	World Health Organization
BOHSc:	Bachelor of Oral Health Sciences
BDS:	Bachelor of Dentistry
ORAL HEALTH STUDENTS:	BDS and BOHSc

CHAPTER 1: INTRODUCTION

1.1 Background

In 2013, approximately 35.3 (32.2-38.8) million people were living with HIV/AIDS globally; of these 3.2 million were children. A majority of these children lived in Sub-Saharan Africa and were infected by their HIV positive mothers during pregnancy, child birth or breastfeeding (WHO, 2014).

Sub-Saharan Africa is the most affected region, with 24.7 million people living with HIV. Seventy one percent of all people living with HIV worldwide lived in this region. South Africans made up 6.3 million of this disease burden (WHO, 2014).

Despite great efforts made by the collaboration of various organizations; global health communities, local government and civil society companies, together with great scientific advances, comprehension of the disease, its prevention and treatment, most people living with HIV/AIDS still don't have access to prevention, care, treatment and most significantly, there is still no cure available (UNAIDS, 2013).

HIV/AIDS is a major public health issue, especially with a large number of the population being unaware of their status. Dental settings require specific methods to protect and prevent the transmission of diseases. Oral health students, as prospective practitioners, need to be aware of and comprehend the significance of HIV/AIDS, specifically the disease processes, its oral manifestations and modes of transmission. Some studies have shown that students lacked that knowledge on management of these patients, specifically with regards to the modes of transmission of the disease (Erasmus et al, 2005).

Dental care for patients with HIV/AIDS plays a vital role in improving their nutritional intake, effectiveness and tolerance of medication, treatment success rate and quality of life (Oberoi et al, 2014).

As the number of people living with HIV/AIDS increases, the possibility of oral healthcare professionals treating more patients with HIV/AIDS will increase and thus will result in an increased risk of cross contamination in the dental setting. Additionally, there will be an

increase in the risk to oral health care professionals of cross infection, possibly due to needle stick injury exposure and other modes of transmission (Erasmus et al, 2005).

Dental procedures, often involve blood and saliva that may contain a variety of blood-borne pathogens and microorganisms, such as HIV. The possibility of HIV transmission in the oral health care setting is generally quite low, though oral health care workers, who come into contact with bodily secretions, are at a high risk of cross contamination (Sadeghi &Hakimi, 2008). This setting is, however helpful for early detection of most lesions of HIV infection, as these may present orally during the first stages of the disease process (Sadeghi &Hakimi, 2008).

Dental practitioners are thus considered as high-risk individuals for cross-contamination in the oral environment (Sadeghi &Hakimi, 2008).

Patients with HIV/AIDS are subjected to a spectrum of potentially painful and health compromising oral conditions. These may be due, either to the disease itself or even the side-effects of the medication. These conditions may be preventable or even treatable with regular dental care. However, when left untreated, it often persists and ultimately leads to discomfort, dysfunction and disability. This in turn, may impact significantly on the quality of life of these patients (Seacat et al, 2009).

In 1988, the WHO had stated ‘All dentists must treat HIV positive patients’. It is unethical and unlawful for dental practitioners or students to refuse treatment to a patient infected with HIV (Sadeghi &Hakimi, 2008). Despite these recommendations, ignorance regarding the risk of HIV transmission during dental procedures have led many dental practitioners refusing or even become reluctant to treat these patients (Sadeghi &Hakimi, 2008).

CHAPTER 2: LITERATURE REVIEW

Multiple bibliographic databases, including EBSCO host, PUBMED, WEB OF SCIENCE, Clinical key and Google Scholar, were used to develop a comprehensive review of the literature on knowledge, attitude and infection control practices of dental students. The databases were searched for publications related to this topic until August 2015. Selected keywords included "*Knowledge*"*, "Attitude", "Infection Control", "dental students", "and HIV/AIDS patients"*.

This review consists of the most recent literature and seeks to provide an overview of the knowledge, attitudes and infection control practices of dental students when managing patients with HIV/AIDS at different institutions in different parts of the world. It reports on the history and prevalence of HIV/AIDS globally, Africa& South Africa, the transmission modes of the virus and the possibility of a cure for the virus. Thereafter, we will discuss international and locally published literature discussing the knowledge, attitude and infection control practices of dental students.

2.1 Epidemiology

"The *HIV epidemic carries within it forces of destruction and of healing. Which, prevails will be the measure of ourselves and our societies" (Jackson, 2002).*

Since the first discovery of the disease, almost three decades ago, HIV continues to be the world's leading infectious killer (Jackson, 2002). There is still no cure for the infection despite the effective treatment with anti-retroviral drugs which has the ability to control the virus somewhat. This ensures that individuals infected with HIV can still enjoy a healthy quality of life and at the same time reduce the risk of transmitting the virus to others (WHO, 2010).

The HIV epidemic has a unique characteristic of not only affecting healthy individuals; but also has a major impact on households, communities, the development and economic growth of nations. The vast majority of HIV infected individuals are found in low or middle income countries and are commonly additionally affected by infectious diseases, food insecurity and other serious issues (WHO, 2010).

Despite these challenges, there has been some success and positivity. New world wide efforts have been implemented to target the epidemic, especially in the last decade. Preventive strategies have aided in reducing the prevalence rates to some degree and new cases of infection are on a decline (Jackson, 2002). In addition, the number of people receiving treatment for HIV in resource poor countries has dramatically increased (WHO, 2010).

Towards the end of 2013, an estimated 2.1 million individuals were newly infected with HIV, globally. This included more than 240,000 children (<15yrs) (Jackson, 2002). According to a UNAIDS report. (2013), 19 million of the 35 million people living with HIV today, are actually unaware that they have the virus (UNAIDS, 2013).

2.2 The history of HIV

More than 25 years ago, clinicians in the USA identified the first cases of the syndrome that was to become the present day term known as "AIDS". This epidemic is known as the most terrifying syndrome and has been likened to the "Black death" of the middle ages, killing millions of people (Whiteside, 2008).

AIDS is caused by the human immunodeficiency virus, which was thought to have crossed from primates to humans. Many diseases spread from animals to humans and are called zoonoses, such as severe acute respiratory syndrome (SARS) and avian bird influenza (bird flu). The HIV crossover may have occurred as early as in the 1930's and the first cases of the current epidemic were reported in the 1970's (Whiteside, 2008).

Medical practitioners reported on unusual cases of extremely rare diseases, which had manifested into an exceptionally serious version in young heterosexual males in America and thus AIDS was reported officially on June 5th , 1981 edition of Morbidity and Mortality Weekly report in Atlanta, USA (Whiteside, 2008).

2.3 HIV in South Africa

Although, the impact of the HIV/AIDS epidemic has been extensive globally, the greatest effects have been experienced in Sub-Saharan Africa, with South Africa contributing the greatest burden of 6.3 million toward the world wide epidemic. Millions have been infected

and killed; hence HIV has been highlighted as a national public health priority (UNAIDS, 2013).

HIV/AIDS is a prominent health priority in South Africa, with its prevalence being the highest compared to other countries globally. The estimated overall HIV prevalence rate is approximately 11.2% of the total (54.95 million) South African population. The total number of people living with HIV is estimated at approximately 6.19 million in 2014. For adults aged 15–49 years, an estimated 16.8% of the population are HIV positive (Stats SA, 2014).

In South Africa 1 in 10 individuals are living with HIV according to Stats SA. The number of South Africans infected with HIV has increased by 2.17 million since 2002, when 4.02 million South Africans were living with the virus. In 2015, 531 965 people were estimated to have died, of this 162 445 were related to HIV according to Stats SA (Stats SA, 2014).

However, the government has taken some measures to combat the disease by implementing certain strategies. The Department of Health, for example, has adopted a new primary health care (PHC) model that places greater emphasis on both the individual and the family, and focuses on health promotion and prevention, and rehabilitative and referral services rather than exclusively on curative services. It avoids fragmentation that results in multiple community health workers visiting families, and ensures that a single integrated team establishes relations with families in the catchment area. It accentuates strong community participation as well as inter-sectoral collaboration. Three pillars of the new PHC model are deployment of PHC outreach teams consisting of professional nurses, enrolled nurses and community health workers in different wards across the country; the establishment of district specialist teams; and strengthening school health services (UNAIDS, 2013).

In order to address the impacts of HIV/AIDS, alternative models of care have been proposed: these include community and home-based care, “step-down”, hospice type of care and building the capacity of primary health care services to provide ambulatory care and support to people with HIV. Apart from their role in protecting hospitals, primary health care services clearly also have other roles in relation to HIV/AIDS care and support: maintaining continuity of care, providing ongoing support and counselling, “wellness” management, treatment and

follow-up of tuberculosis and ensuring a continuum of care with other providers. In addition, if the many calls for greater access to anti-retroviral drugs in the public sector are to materialize, the PHC infrastructure will be the major vehicle through which this will happen (Gauteng health, 2014).

In its five-year plan, HIV/AIDS and STD Strategic Plan for South Africa (Department of Health, 2000) the national government has identified the following care and support goals, to provide treatment, care and support services in health facilities (includes treatment of opportunistic infections, drug supplies and guidelines) and to provide adequate treatment, care and support in communities (develop, implement and to increase acceptability of models of community/home-based care) (Gauteng health, 2014).

Additionally, to improve access to voluntary testing and counselling, develop and expand the provision of care to children and orphans (Gauteng health, 2014).

The Gauteng government has developed its own five-year AIDS Strategy for the Province. Key components of the strategy include mobilisation, prevention, care and inter-sectoral action. As part of its AIDS Strategy, the Gauteng government has developed a care policy around the notion of the continuum of care. It includes support for people with AIDS (in communities, support groups, counselling), care services: medical (clinics, hospitals, TB) and palliative (home care and terminal/respite care facilities). This includes families and orphans, social support, grants and referral systems (Gauteng health, 2014).

Coordinated intersectoral action through local government is the key to the implementation of care and support policies. Promoting and supporting community based activities and universal access to primary AIDS care are the crucial building blocks of an AIDS care strategy (Gauteng health, 2014).

It is anticipated that AIDS care will become an integral part of primary health care services and will include the following package of services (personal communication, Dr Liz Floyd) This includes counselling (pre and post-test, ongoing and bereavement) and diagnosis (including testing).

Primary AIDS care, including prophylaxis for TB treatment, Palliative care and Referral (first level hospitals, TB hospitals, hospices, home-based care, support groups, welfare services)

To provide support to home-based care (referrals, supplies, management support) and prevention of occupational exposure and post exposure prophylaxis.

As part of achieving the above, the Gauteng AIDS Directorate has developed a series of Guidelines for primary health care providers. These include adult and paediatric HIV/AIDS Medical care, voluntary counselling and testing, and palliative care guidelines. The purpose of these guidelines are three-fold: to increase access to primary HIV/AIDS care, to promote quality of care by defining the minimum package of expected care and to reduce the burden of HIV/AIDS care on hospitals (Gauteng health, 2014).

South Africa has the largest and most comprehensive programme on HIV and AIDS, which reflects the variety of interventions being made with Comprehensive Plan for Management, Care and treatment of HIV and AIDS in South Africa. Government provides a number of interventions to delay the progression from HIV infection to full blown AIDS defining illnesses and to maintain optimal health for people with HIV/AIDS. For example, a tender to the value of R3.4 billion is in place for procurement of anti-retroviral drugs which are made available to the public for free. Most vulnerable children are receiving social support and have free access to health services and education (Modiba, 2004).

South Africa has expanded the PMTCT (prevention of mother to child transmission) to over 90% of public health facilities in an effort to attain global targets in addressing HIV and AIDS. All antenatal clinics are offered PMTCT services as part of a comprehensive approach to maternal, child and women's health services (Modiba, 2004).

Antenatal attendance is high at 80% and all these women are provided with appropriate counselling. All pregnant women testing HIV positive are offered CD4 count testing and those with counts lower than 200 are offered antiretroviral treatment (Modiba, 2004).

2.4 Transmission of HIV

The potential pathways for virus transmission involve endocytosis, transcytosis, and virus attachment to mannose C-type lectin receptors (e.g. DC-SIGN) located on dendritic cells and macrophages. The initial replication takes place in the regional lymph organs (e.g. draining lymph nodes) and is composed of a few viral variants, and leads to modest primary amplification. Due to the migration of infected T lymphocytes or virions into the bloodstream,

secondary amplification in the gastrointestinal tract, spleen, and bone marrow results in the massive infection of susceptible cells (Simon, 2006).

In close relation with the resulting peak of viraemia (e.g., 106 to 107 copies per mL plasma), clinical symptoms can manifest during the primary HIV-1 infection. The level of viraemia characteristic for the chronic phase of infection in an individual (viral set point) differs from the peak viraemia by one or two orders of magnitude. This reduction is largely attributed to HIV-1 specific CD8+ responses but target cell limitation could also play a part. The viral population is mostly homogeneous early after transmission, but as viral quasi-species diversify in distinct biological compartments, mutant viruses that are resistant to antibody neutralisation, cytotoxic T cells, or antiretroviral drugs are generated and archived in long-lived cells (i.e., viral reservoirs) (Simon, 2006).

According to the Centres for Disease control (2015): In the United States, HIV is spread mainly by having sexual intercourse or sharing intravenous drug equipment like needles, with someone who has HIV.

Only certain fluids like blood, seminal fluid, pre-seminal fluid, rectal fluids, vaginal fluids, and breast milk, from an HIV-infected person can transmit HIV. These fluids must come into contact with a mucous membrane or damaged tissue or be directly injected into the bloodstream (from a needle or syringe) for transmission to possibly occur. Mucous membranes can be found inside the rectum, the vagina, the opening of the penis, and the mouth (Kelly, 2015).

In the United States, anal sexual intercourse is the highest-risk of sexual behaviour. Vaginal sexual intercourse is the second highest-risk of sexual behaviour, having multiple sex partners or having other sexually transmitted infections can increase the risk of infection through sexual intercourse. Sharing needles, syringes, rinse water, or other equipment (works) used to prepare injection drugs with someone who has HIV are also some methods of transmitting the virus (Kelly, 2015).

In South Africa, there are many factors that contribute to the high prevalence and spread of the virus. Some of these include: poverty, inequality and social instability; high levels of sexually transmitted infections, the status of women, sexual violence, high mobility (migrant labour),

limited and uneven access to quality medical care and a history of poor leadership in the response to the epidemic (Modiba, 2004).

Less commonly compared to those mentioned above, HIV may be spread by being born to an infected mother; the virus could be passed from mother to child during pregnancy, while giving birth, or breastfeeding. In South Africa, the successful introduction of the PMTCT program has contributed greatly to the reduction in this form of transmission. An injury with an HIV-contaminated needle or other sharp objects poses a risk mainly to health care workers. Blood transfusions, blood products, or organ/tissue transplants that are contaminated with HIV is another form of transmitting the virus, this poses a risk that is extremely small because of rigorous testing of the US blood supply and donated organs and tissues (Kelly, 2015).

Eating food that has been pre-chewed by an HIV-infected person is another mode of transmission, where contamination may occur when infected blood from a caregiver's mouth mixes with food while chewing; however this mode is extremely rare (Kelly, 2015). In the event of being bitten by a person with HIV, in the case where there is severe trauma with extensive tissue damage and the presence of blood. However, there is no risk of transmission if the skin is not broken (Kelly, 2015).

Any form of oral sexual intercourse, contact between broken skin, wounds, or mucous membranes and HIV-infected blood or blood-contaminated body fluids, have the ability to transmit the virus. These reports have also been extremely rare. Deep kissing between individuals, where the infected person has sores or bleeding gums and blood is exchanged has the ability to transmit the virus (Kelly, 2015).

2.5 Cure for HIV

Antiretroviral treatment is the best option for long lasting viral suppression and subsequently for reduction of morbidity and mortality. However, this current use of drugs does not totally eradicate the HIV-1 infection and lifelong treatment may still be required (Simon, 2006).

The high rate of viral replication, low fidelity of reverse transcriptase and the ability to recombine, are the viral characteristics that lead to the diversity of HIV-1 species (quasi-species) in chronically infected individuals. This highly genetic variability provided the

rationale for the highly active antiretroviral treatments (HAART). By combining several potent antiretroviral agents, viral replication is suppressed to such low levels that the emergence of drug resistant HIV-1 variants was, if not prevented, at least delayed (Simon, 2006).

By doing so, CD4+ T-lymphocyte numbers increase, leading to a degree of immune reconstitution that is sufficient to reverse clinically apparent immunodeficiency (Simon, 2006).

2.6 Global Picture of HIV/AIDS Knowledge, Attitude and Infection Control Practice (KAP studies) of dental students

2.6.1 Literature from Developed countries

Despite the extensive search which was carried out, only two articles from the United States were found from developed countries (Seacat et al, 2003),(Seacat et al, 2009).

There is a definite gap in literature regarding this topic in developed countries, reasons for this could be investigated, one possibly due to the smaller numbers of people living with HIV/AIDS in those countries (Seacat et al, 2003).

In 2003, Seacat et al conducted a survey that sought to investigate the knowledge and attitude among 315 dental (54.6% female/45.3% male) and 89 dental hygiene (93.3% female/5.6 % male) students. This study discussed four themes: **(a)**: Perceptions of their education about treating patients with HIV/AIDS, **(b)**: Knowledge of universal precautions**, (c)**: Attitudes toward treating these patients and patients perceived to be at risk for HIV infection& **(d)**: evaluation of potential curricular activities such as discussion groups with HIV infected patients. This study utilized a self-administered questionnaire that assessed the knowledge and attitude of the dental students that included questions on student's personal background and four groups of outcome variables. There were four additional sections, which were: (1). Education about treating patients from diverse backgrounds and patients with HIV infections /AIDS and Communicable infectious diseases; (2) Methods of enhancing the curriculum; (3) Knowledge of HIV/AIDS and Universal Precautions and; (4)Attitudes towards patients at risk of or infected with HIV/AIDS (Seacat et al, 2003).

They found that dental students had answered significantly more knowledge questions about universal precautions correctly than did the dental hygiene students (4.42 vs. 3.70, p=0.000). This level of knowledge seemed to increase over the course of the program. Male students had a significantly stronger negative attitude towards patients at risk for or with HIV/AIDS than female students. Both dental and dental hygiene students responded positively to the suggested methods for including more material on these types of patients such as case studies, discussion groups and other such similar activities. This study concluded that these students were interested in learning more about treating patients with HIV/AIDS (Seacat et al, 2003).

The 2009 paper by Seacat et al utilized Weiner's Attribution- Helping model to explain how a patient's perceived responsibility for contracting HIV might have an impact on the dental care provider's attitudes and behavioural responses toward people living with HIV/AIDS. One hundred and eighteen (n=118) dental students were recruited from a New England dental program. All students read one of three brief patient scenarios, in which the mode by which the individual contracted the disease was manipulated. The participants then completed a survey which assessed :(1) perceptions of the patient's responsibility for contracting HIV, (2) knowledge of HIV, (3) treatment attitudes. The results of this study indicated that the variable attributions of responsibility were significantly and positively associated with treatment attitudes. As the participants scored higher on the knowledge scale, their negative attitudes toward treatment of these patients decreased. As the participants attributed greater amounts of responsibility to the person, they also reported greater negative attitudes about treating him or her (Seacat et al, 2009).

Lastly, participant attributions were found to suppress the effect of HIV knowledge on treatment attitudes. The once statistically significant impact of HIV/AIDS knowledge on treatment attitudes was diminished by including participant attributions as a predictor of treatment attitudes. This was an unexpected finding for the researchers especially since HIV – related knowledge and participant attributions were found to be virtually uncorrelated (r^2=.03). They do highlight that possible limitations of this study could have been the cross sectional design, where participants were recruited at one point in time and from courses within the dental school curriculum. Also, this study had recruited from only one dental program and there is a possibility of limiting and influencing the results (Seacat et al, 2009).

2.6.2 Studies from Developing Country Settings

Several research articles have been published from various developing country settings. In Taiwan, Hu et al, (2004) conducted a study which compared dental students' knowledge and attitude towards Hepatitis B, C and HIV infected patients. A self-administered questionnaire was utilised among a sample of 1050 students enrolled at seven dental schools in Taiwan, with a response rate of 54.4%. Multiple logistic regression analysis was used to assess the relationship between multiple factors and the willingness to treat infected patients (Hu et al, 2004).

Multivariate analysis was used to compare knowledge levels and willingness to treat patients. Their findings indicated that 80%, 75% and 49 % were willing to treat HBV, HCV & HIV infected patients, respectively and the differences among these percentages were significant. The students were found to be less knowledgeable about HCV infection compared to HBV and HIV infection. Factors significantly associated with treating HBV or HCV infected patients were: a: "feeling morally responsible" and b: "being able to treat infected patients safely". Those feeling morally responsible (odd ratio (OR) =33.0, 95% confidence interval [CI] =15.2, 71.8) and those being able to treat infected patients safely (OR=4.1, 95% CI= 1.7, 9.9) were more willing to treat HIV patients. This study concluded that these Taiwanese students were more willing to treat patients with the other two infections (HBV and HCV) compared to those patients infected with the HI virus (Hu et al, 2004).

Sadeghi&Hakimi, (2008) conducted a study that assessed the knowledge and attitude of dental students towards HIV/AIDS patients in Iran. A 53-item self-administered questionnaire was utilised among 455 dental students (n=455), who had participated in the 10th Dental Student Congress in Isfahan, Iran. The response rate to the questionnaire was 60.7%. The total mean knowledge and attitude scores were 82.1 % (excellent) and 57.4 % (negative), respectively. There appeared to be no significant difference in knowledge and attitude scores between genders. Their results indicated that although a majority of the students had excellent knowledge (78.4%), only 1% had a good professional attitude regarding treatment of these patients (Sadeghi&Hakimi, 2008). Interestingly, in this study a total of 49.7% of the students agreed that they were "not obligated to treat HIV/AIDS patients", 34.8% said that these patients "should be treated at a separate ward" and only 11.6 % of these students declared that

they will treat these patients. Additionally, in Iran there are a few centres that actually treat patients with HIV/AIDS, and 24.6% of these students were not aware of the presence of these centres (Sadeghi&Hakimi, 2008).

Several studies Shaikh,(2011), Shan & Bala,(2011), Patil & Goel,(2011) and Shailee et al, (2013) of a similar nature were published in India, however the findings were variable and each took place in a different state of India. In Bangalore, Shaikh, (2011) assessed 235 dental undergraduate students, from 1st to 4th year completed a cross sectional survey with a response rate of 83.33%, with an age range of 17-22yrs and a male: female ratio of 64:171 (Shaikh, 2011).

Their results found that the majority (76.6%) of the students had moderately adequate level of knowledge, although "adequate or moderately adequate" was not defined clearly by the authors. The most adequate attitude was evident among the 1st year students in terms of social interaction. The most adequate attitude in terms of legal, personal risk and consequences was highest among the final year students. This study concluded that even though gaps did exist for certain issues, a majority (90.7%) of them were willing to treat patients with HIV/AIDS (Shaikh , 2011).

In Ahmedabad, Shan & Bala, (2011) conducted a study among 3rd and 4th year dental students who were clinical students of the college (n=150). The male to female ratio was 79:71. The mean age of this sample was 20.5yrs. The mean score of knowledge regarding general and dental aspects was 9.73 and 5.08 respectively, which was statistically significant (p value was not reported on). Most of these students (96%) used gloves and a mask, however only 29% of these students used protective eyewear. This study concluded that the knowledge of these students was low and only 12% of them thought that patients with HIV/AIDS should be treated at a public dental facility thus indicating a poor attitude. They also highlighted the importance of teaching dental students the various aspects of the disease and also that universal infection control practices should be emphasized at an early level of their curriculum and re-enforced periodically (Shan& Bala, 2011).

In Meerut, another state in India, Patil & Goel, (2011) conducted a study among 219 dental students who completed a self-administered questionnaire which assessed their knowledge,

attitude and willingness to treat patients with HIV/AIDS. Their findings were that the level of knowledge was considered to be excellent, with a total mean score of 76.5%. There was a statistically significant difference in knowledge levels among the different years of study ($p<0.001$). The study also found that the mean attitude score was 62.9 % (negative attitudes).

The majority of the students felt that the risk of contracting HIV, from needle stick injury, saliva and aerosols were high and there was a fear of contamination when treating these patients. This major concern of occupational exposure could possibly explain the negative attitude that the students possessed toward the patients with HIV/AIDS (Patil & Goel, 2011).

There was no significant difference in attitude of the students in the different levels of study ($p>0.001\%$). The Karl Pearson correlation test showed that there was no correlation between the knowledge of HIV/AIDS and the attitudes of students towards patients with HIV/AIDS ($p>0.01\%$) (20). These findings concluded that although these students had adequate knowledge levels about HIV/AIDS, their attitude towards this group of people was still found to be of a negative nature (Patil&Goel, 2011).

In Shimla, India, Shailee et al, (2013) conducted a study among all their dental students, first to final year (n=164) with a response rate of 93.7%, but with a completion rate of 91.6%. The total average knowledge percentage was 68.3% which was considered to be "good knowledge".

Interestingly, the average percentage of correct knowledge responses was 76.8% in the clinical group and 59.8% in the pre-clinical group, this difference was found to be statistically significant ($p=0.01$). The results of this study showed that the overall average attitude score was 65.6% and this was regarded as having a negative attitude. Only 4.8 % (n=8) had a positive attitude. The average attitude score percentages of the pre-clinical group (57.9%) and clinical group (73.3%) were statistically significant ($p=0.02$). This meant that a more positive attitude score was found among the clinical students as compared to the pre-clinical students. They found that the higher the students' knowledge level was, the more positive were the attitude towards the patient with HIV/AIDS, according to Spearman's correlation coefficient($r=0.312$; $p=0.03$) (Shailee, 2013).

A cross sectional study conducted by Ellepola et al, (2011) where dental students from Kuwait (KU)and Sri Lanka (UP) were compared in terms of their knowledge levels and attitude about HIV/AIDS. This study was unique in that it was an international comparative study between two countries with a diverse cultural and educational background (Ellepola et al, 2011). This cross sectional survey was undertaken among a total of 215 dental students (160 from UP & 55 from KU) representing clinical dental students from both universities. The comparative mean scores of students from both universities in all categories assessed for knowledge was found to be 45.23 +-4.35 for KU students and 43.56 +-4.71 for the UP students, this difference was statistically significant($p=0.018$). However, the UP students demonstrated a more highly significant positive attitude with a mean score of 7.1 +-2.13($p<0.001$) toward the disease than those at the KU university who had a score of 5.36 +-2.56. This study concluded that in both countries the level of knowledge was acceptable; however their attitudes could have been influenced by their curriculum at the different universities as well as the diverse cultural and social backgrounds (Ellepola et al, 2011).

Sri Lanka, a South Asian island, is a source and destination for men, women and children trafficked for the purposes of involuntary servitude and commercial sex exploitation. The dental students are made up of a group that are multi-ethnic and multi-religious

(Ellepola et al, 2011).

Kuwait is a Middle Eastern Arab country that is predominantly a destination for people who migrate legally from South and South East Asia for domestic or low-skilled labour. The dental students are comprised of a group of predominantly Arabs and are of the Islamic culture (Ellepola et al, 2011).

There are also major disparities in the economic status of the both countries (Ellepola et al, 2011). A more detailed explanation of the differences in culture is available in the discussion section of this research report.

The two risk factors of spread of HIV, identified for both countries was the high prevalence of commercial sex in Sri Lanka and underreporting of cases in Kuwait due to the fear of deportation (Ellepola et al, 2011).

The differences in their curriculum is highlighted by the fact that, in Sri Lanka their dental program consists of a duration of four years, of which the first two years are preclinical years and the last are their clinical years. In Kuwait however, their undergraduate dental program is comprised of a six and a half year program, of which the first four years are preclinical and only the last two years are dedicated to clinical work.

Ellepolla et al, (2011) also conducted a study exclusively among the dental students at Kuwait University during the same year. The students (n=55) completed a self-administered questionnaire with a response rate of 77.5%. The sample here consisted of a majority of females (47/85.5%) as compared to males (8/14.5%). This is due to the fact that a majority of the dental students at the university were females. The total knowledge scores ranged from 34 -53; 89% of the students demonstrated a high level of knowledge, while the rest of the students had a medium level of knowledge. The attitude of these students with regards to treating patients with HIV/AIDS was found to be a predominantly negative attitude (63.6%). This study concluded that even though there was a high level of knowledge among these students, they still displayed a negative attitude toward these patients. The investigator also highlighted that their attitude was a reflection of their cultural background rather than their professional knowledge. They also highlighted that there was a definite need to address students' misconceptions and attitudes toward the disease (Ellepola et al, 2011).

In Jordan, Ryalat et al, (2011) aimed at addressing the suspected deficiency in the level of understanding of HIV/AIDS among clinical (n=114[27 males vs. 87 females]) and pre-clinical (n=97[16 males vs. 81 females]) students at the University of Jordan. A structured questionnaire was utilised to assess the knowledge and attitudes of these students and to compare these findings between the pre-clinical and the clinical students (Ryalat et al, 2011). This study concluded that the level of knowledge of Jordanian dental students about HIV/AIDS was generally acceptable; however some inadequacies were noted with regards to some aspects of the AIDS epidemic. A significantly higher proportion of third year (pre-clinical) students compared to the fifth year (clinical students) (39.2% vs. 26.3%) thought that HIV/AIDS patients should be referred to other centres or support groups for treatment($p=0.04$) Interestingly though, it was also reported that 73.5% of the clinical fifth year students and 60.8% of the pre-clinical third years, thought that HIV/AIDS patients should be treated at any

dental facility with the same respect and dignity as other patients but after taking special precautionary measures (Ryalat et al, 2011).

In Saudi Arabia, Alsamghan, (2012) assessed the knowledge and attitude of the male dental students at King Khalid University when treating patients with HIV/AIDS. This study was of a cross sectional nature with an analytical component. Of the 400 male dental students, only 363 students completed the questionnaire, resulting in a 90.8% response rate. The age range was between 20-29 years. The total mean knowledge was 62.7% and was regarded as good. Insufficient total knowledge score was reported among almost one third of these students (34.7%). The overall mean attitude was found to be 66.4 (SD6.8%). The attitude among 9.1% was positive, a majority 90.1% was negative and 0.8% was passive. Pearson correlation coefficient showed that those students with higher knowledge scores had significantly more positive attitudes towards patients with HIV/AIDS ($r=0.223$, $p<0.001$).

This study concluded that since there were some gaps in knowledge, these students were less prepared for their future task of treating patients with HIV/AIDS and highlighted a need to improve their dental curriculum regarding HIV/AIDS (Alsamghan, 2012).

The most recent research conducted in the Middle-East of a similar nature was Peeran& Ramalingam, (2015) and Premadasa et al, (2015), in Libya and Ajman, United Arab Emirates (U.A.E) respectively.

In the study conducted in Libya; an admirable point to take in to account was that it was the only study of this nature ever conducted in this country, as well as the 100% response rate to the self-administered questionnaire achieved. A total of 101(n=101) dental students participated in this study, made up of the 3rd year and 4thyear students & interns. The Libyan students felt that their knowledge on HIV/AIDS was inadequate. Only 22% of 3rd years, 32.5% of 4th years& interns were aware of the possible transmission route that aerosols posed. ($p=0.49$). An additional example of the inadequate level of knowledge was demonstrated when 65.9% of the 3rd years and 70.4% of the interns felt that “HIV was not transmitted through breast milk” but 61.3% of the 4th years agreed that “HIV is transmitted via breast milk”. However, this difference was not significant ($p=0.24$). The author then justifies these inadequate levels of knowledge by explaining the environment of Libya being volatile and that

these students lack the ability to concentrate on their studies sufficiently and do not attend regular lectures due to issues such as security and tribal tensions

(Peeran& Ramalingam, 2015).

With regards to the attitude levels, 22% of 3rd years, 58.1% of 4th years and 51.9% of the interns felt that "patients with HIV/AIDS could be treated in a normal setting". Also, 53.8% of all students felt that they were ethically responsible for treating HIV positive patients. These two examples led the authors to conclude that in spite of the inadequate levels of knowledge, the Libyan students had a positive attitude towards handling patients with HIV/AIDS. Also, Libyan students were concerned about the welfare of HIV patients (Peeran& Ramalingam, 2015). The authors also recommended modification of existing modes of teaching, continuing dental learning with current trends and updates was a vital necessity to motivate the current generation of students (Peeran& Ramalingam, 2015).

In Ajman, U.A.E, Premadasa et al, (2015) conducted a similar study assessing the knowledge and attitudes of dental students in a cross-sectional survey among 106 dental students, which included 1st year to 4th year students, with a response rate of 97.2% achieved. This sample comprised a total of 25 % males and 75% females. This study had results which demonstrated that the students had an overall knowledge score of 39.5(67%, maximum possible=59). The median attitude score was 14 out of a total of 24, with no significant differences between gender and years of study. Although the knowledge levels of the more senior students was higher than of the earlier academic years, the negative attitudes they possessed remained unchanged. These authors then concluded that educational programs should be created to modify misconceptions and negative attitude (Premadasa et al, 2015).

In Africa, Azodo et al, (2010) from Nigeria investigated a similar research topic which assessed the self-reported levels of knowledge, attitude and infection control practices of the dental students. They conducted a descriptive, cross sectional survey among 58 final year dental students, with a response rate 76.3 % (58/76). HIV-related knowledge was reported as high, only among 31% of the respondents. Of the respondents, 82.7% (n=48) desired more knowledge about safety precautions during treatment of patients with HIV. A total of 86.2 % (n=50) of the students reported good infection control practices. Almost all respondents

(98.3%) agreed that oral health care for HIV+ patients would improve their quality of life but only 58.8% expressed a willingness to treat these patients. The authors concluded by suggesting that the need to have a comprehensive educational/motivational program for the next generation of students to ensure adequate care of HIV+ patients. They also mention that the perceived deficiency revealed in this study should serve as a vital guide for possible curriculum change on HIV related issues (Azodo et al, 2010).

2.6.3 Studies from South Africa

In South Africa, Erasmus et al. (2005) conducted a study that aimed to assess the levels of knowledge, attitude & behaviour when managing patients with HIV/AIDS. They had utilised a self-administered questionnaire among 125 dental and 25 oral hygiene students (n=150). The average response rate of the total students was 68%, with an age range of 18-35yrs (mean=21.66) (Erasmus et al, 2005).

Their findings indicated that the level of knowledge increased with an increase in year of study, with an exception of the oral hygiene program which seemed to decrease, although not significantly (p value wasn't reported on).The majority (79%) of the students felt that patients with HIV/AIDS should be treated at any dental facility and that these patients are entitled to be treated with the same respect and dignity as other patients. Eighty six per cent of the students indicated that special precautionary measures should be taken when treating patients with HIV/AIDS. It was also discovered that when assessing the behaviour practices of these students, only thirty one per cent of all students reported to be using all barrier techniques. Protective eye wear was worn less by dentistry students than oral hygiene students. In this study, even though there was an increase in the level of knowledge as they progressed through the years; it did not translate to a more positive student behaviour practices toward infected patients. They concluded that the students did seem to possess a relatively high understanding of HIV/AIDS; however this had little or no influence on the student's attitude and behaviour in managing HIV/AIDS patients (Erasmus et al, 2005).

Another study that assessed the knowledge, attitude and infection control practices of dental students was conducted at MEDUNSA Oral health centre (MOHC). Currently renamed Sefako Makgatho Sciences University (SMU) by Galane, (2012). This was a cross-sectional study conducted among 120 dental students at MOHC using a self-administered questionnaire with

30 closed- ended questions. The response rate was 86% (120/139), 33 of third year, 47 of fourth year and 40 of fifth year dental students (Galane, 2012).

His findings indicated that gender was statistically significant towards knowledge and females were more knowledgeable about HIV/AIDS as compared to males (p=0.058). Galane, (2012) reports this as his p value, even though he clearly states that he's findings were 'significant'. A significant p value was set as $p<0.05$ in his methodology section. However, almost (98.3%) of all dental students were not sure whether "HIV increases other infections, including oral infections as well". More than half (53.1%) of third year dental students were not sure of whether "persistent generalised lymphadenopathy is associated with stage 2 of HIV infection". In this study, ethnic groups and level of study (BDS4 & BDS5) were found to be significant predictors of attitude regarding HIV-positive patients (p=0.001). (BDS4: p=0.055) (BDS5: p=0.001). Practice was found to be a significant predictor of knowledge regarding HIV/AIDS (p=0.046). Pearson's correlation coefficient showed that students with positive attitude scores had significantly excellent practice regarding HIV/AIDS (r=0.2912) (p=0.001). Good knowledge translated into excellent infection control practices, whilst positive attitude towards HIV/AIDS patients yield excellent infection control practices (Galane, 2012).

The author concluded that the dental students at MOHC had a relatively good understanding of HIV/AIDS (particularly the mode of transmission) but to lesser extent, disease progression and oral manifestations. The lack of knowledge on HIV/AIDS and inconsistency regarding certain infection control procedures may have been a reflection of insufficient HIV/AIDS teaching and clinical supervision of the students in the wards. He further suggests that there is a need to improve the current dental curriculum, by including HIV/AIDS modules and incorporate a clinical component of dental screening at the ARV clinics (Galane, 2012) .

We can clearly state that cultural and ethnic differences may have a great influence on the attitude that the individual may have. Some studies found that with an increase in knowledge there was a positive increase in the attitude of the students, whereas another study found that even though the knowledge levels were high the negative attitude of the students remained negative.

2.7 Summary

Although there were variable findings among the studies reviewed, a few general findings could be made.

The variable HIV-related knowledge levels were commonly found to be significantly and positively associated with attitudes towards treatment, as when participants scored higher on the knowledge scale, their negative attitudes toward treatment of these patients decreased Shailee et al, (2013), Alsamghan, (2012).

In specific countries with a strong cultural background and instilled prejudices, high levels of knowledge were not correlated with a more positive attitude towards treating HIV/AID patients (Ellepolla et al, 2011). Their attitudes reflected the culture of the society in which they trained and lived rather than their professional knowledge. As the Ellepolla, (2011) study showed the culture in Kuwait may also have had a significant impact in their attitudes. For instance, in traditional Islamic cultures, sex and sexually transmitted diseases are topics that are not discussed openly amongst family members due to their conservative nature. Though the knowledge may have been imparted to the students', in order to provide sufficient reasoning power to avoid discrimination, it is possible that they still hold stigmatising views towards PLWHA (people living with HIV/AIDS), due to their conservative upbringing. Whilst verbally supporting the rights of infected people, they may still want to avoid actual contact with them (Ellepolla et al, 2011).

Some studies also found that the fear of HIV exposure was a major contributing factor to the negative attitude that the students had despite their high levels of knowledge (Patil &Goel, 2011) (Sadeghi &Hakimi, 2008)(Premadasa et al, 2015)(Grover et al, 2015).

Male students had a significantly stronger negative attitude in some studies towards patients at risk for or with HIV infection/AIDS than female students (Seacat et al, 2003) (Hu et al, 2004). As students progressed through the curriculum, their knowledge levels increased (Erasmus et al, 2005) (Seacat et al, 2003).

2.8 Rationale and significance of the study

It has been hypothesized that the willingness to treat patients with HIV/AIDS appears to be related to the knowledge of the disease and it may influence the attitude towards managing these patients (Erasmus et al, 2005) (Oliveira, 2002) (McCarthy& MacDonald, 1999).

The assessment of knowledge, attitude and infection control practices of dental students and dentists is essential to encourage good management and assessment of issues when treating patients living with HIV/AIDS good management of patients with HIV/AIDS. In terms of planning the curriculum and training of students, dental schools require this baseline data to modify and tailor their programs to address any shortcomings that may be evident after the survey is conducted. This much needed study will provide exactly that type of baseline information that can aid in curriculum design in terms of content, context and structure.

There is a paucity of published studies that have investigated this issue in settings where HIV/AIDS infection rates are high such as South Africa. Although two other studies did investigate this topic, in the Western Cape (Erasmus et al, 2005) and at Garangkuwa (Galane, 2012), this current study would have either confirmed their findings or disagreed with them. The Erasmus et al, (2005) study was conducted during the earlier days of the discovery of HIV/AIDS and the Galane, (2012) study was conducted in a more recent era, however cultural and racial issues were taken into consideration in the Galane study. This current study did not take racial differences into account when demographic factors were considered.

In order for the management and treatment of the highest quality to be delivered to patients, irrespective of their HIV status, dental professionals and students are required to be fully knowledgeable of the significance of HIV/AIDS. This study is of great importance as it will assess these variables and decisions can be made regarding curriculum change and adaptation for these students to further enhance and improve their management skills when treating patients with HIV/AIDS, if it is needed.

Aims and Objectives

AIM

The aim of this study was to determine the knowledge, attitude and infection control practices of undergraduate Oral health students in managing patients with HIV/AIDS at the School of Oral Health Sciences, University of Witwatersrand in 2015.

OBJECTIVES

1. To determine:

1.1 Knowledge levels among the Oral Health students
1.2 Attitude of Oral health students regarding treatment of patients with HIV/AIDS
1.3 The infection control practices of the Oral health students

2. To determine:

2.1 If there is a correlation between the knowledge and attitude of the students.
2.2 To compare the differences between the oral hygiene (BOHSc) and dental (BDS) students.

3. To compare the knowledge and attitude (KA) between students in the pre-clinical vs. clinical years

4. To compare the differences between the BOHSc and BDS students as regards KA

CHAPTER 3: METHODOLOGY

This chapter describes the research methodology used to conduct this study. The ethical considerations and analytic techniques pertaining to this study are also dealt with in this chapter.

3.1 **Study Design**

This Knowledge, Attitudes and Practices (KAP) survey is of a cross-sectional design with an analytical component. A KAP survey is a needs assessment survey which aims to evaluate the knowledge, (K) attitudes (A) and practices (P) of a population or community. It is based on a questionnaire used in a representative sample of the population being studied. In certain instances KAP surveys may also be used to evaluate a programme such as educational or even any type of intervention e.g. Health. KAP surveys can be used to provide policy guidelines in addition to providing the overall scenario on the issue in which they are designed (KAP survey model).

The **knowledge** for this study population refers to the understanding that dental students have with regards to diagnosis, transmission modes and the common oral manifestations of HIV.
The **attitudes** are their feelings and pre-conceived ideas towards treating patients that have been diagnosed with HIV/AIDS.
The **practice** refers to the infection control methods utilised when treating patients with HIV/AIDS.
The limitations of KAP surveys have been documented in the literature (Kolisa, 2009). Some of these limitations are:
The validity of data collected using quantitative KAP survey interviews to understand people's knowledge and attitudes have been questioned, particularly when investigating sensitive topics such as HIV/AIDS (Kolisa, 2009).
Furthermore, the context in which KAP surveys are undertaken must be considered. For example, cross-cultural differences may affect the results, but are often difficult to evaluate in KAP surveys. People might also feel uncomfortable revealing information about themselves or others in their lives (Kolisa, 2009).

These factors mentioned above, highlights the fact that we often rely exclusively on KAP survey data to understand complex issues. Another limitation with KAP surveys is that if variables are pre-coded, this almost 'leads' the participants towards the responses listed, and might not be an accurate reflection of real knowledge or attitude levels in the group studied (WHO, 2010).

A KAP survey essentially records an "opinion", and is based on the "declarative" (i.e., statements). In other words, the KAP survey reveals what was said, but there may be considerable gaps between what is said and what is actually practiced. These discrepancies may be unconscious: we can feel like we are doing something without that necessarily being the case (Maimaiti, 2011).

KAP surveys are often used to identify possible inadequacies in knowledge, attitudes and practices which was the purpose of this current study. KAP studies determine what people know about certain topics, how they feel, and how they behave in relation to their knowledge. Such studies function as educational diagnosis of a specific community regarding a topic and are useful in creating awareness and finding solutions. Advantages of KAP surveys include ease of study design, interpretation and a concise display of results and generalizability. Moreover, KAP surveys have the ability to reveal individuals' ideas regarding the topic of discussion (Ramphoma, 2014).

3.2 Study Population & Sampling

All undergraduate dentistry students from first to final year (Dental and Oral hygiene students) enrolled at the University of Witwatersrand in 2015 were invited to participate in this study. The 1st & 2nd year dental students were regarded as the pre-clinical group, as they had not commenced with their practical work in the clinics, at the time that the data was being collected. The number of students per class was much smaller compared to other published studies. Among the 1st year dental (BDS1) there was a total of 36 students, among 2nd year dental students(BDS2) there were 21 students, among 3rd year dental (BDS3) there were 26 students, among 4th year dental students(BDS4) there were 24 students and 5th year dental students(BDS5) there were 22 students. There were two classes of Oral Hygiene students, this was the first group of students that had applied for the new Bachelor of Oral Health Sciences (BOHSc), and they consisted of 1st years and 2nd years and had an even smaller number of

students per class, i.e. 13 individuals per class. Both these classes had been part of the clinical group of students at the time that the questionnaire was administered. In total, all 155 dental and oral hygiene students were invited to participate in this study. Due to the small class sizes (approximately 30 per class), a convenience sampling technique was utilized and all students in the target population were invited to participate in the study.

3.3 Study Setting

Wits Oral health Centre (WOHC) is an academic institute that is situated in the urban area of Parktown and has a direct link to the Charlotte Maxeke Johannesburg Academic Hospital.

It provides various oral health care services commencing with preventative and reaching heights of providing implant tooth replacement at an affordable fee.

3.4 Inclusion Criteria

All dental (BDS& BOHSc) students who consented to being part of the study, and who were present on the day of data collection. The students had to be 18 years & older. Those who did not meet the age requirements or had not completely answered the questionnaire were excluded from the study.

3.5 Methods

3.5.1 Study Instrument

A validated self-administered questionnaire adapted and modified from a previous study; Sadeghi &Hakimi, (2008), Shailee et al, (2013) was administered to the participating students. This questionnaire was utilized to determine the knowledge levels with regard to HIV infection and transmission patterns, attitudes toward treating patients with HIV/AIDS and infection control practices of the dental students (Appendix V).

The first section was aimed at determining the demographics of the students, the second section assessed the levels of knowledge and these were answered by choosing the one correct answer. For each correct answer, there was a score of 2, if incorrect; a score of 0 was achieved. These were summed and scored as a percentage score. Therefore a student's score could range between 0 %(no correct answers) and 100 % (all answers correct). A higher score

meant higher levels of knowledge, >75%: was regarded as excellent knowledge levels; 50-75% good levels of knowledge; 25-50% moderate; <25% weak (5). This section was made up of ten questions. Similar cut-off were used in the Sadeghi &Hakimi, (2008) and Shailee et al, (2013) studies.

The second section consisted of ten questions that assessed attitude and was answered using a five-point Likert scale (strongly agree=5, agree=4, neutral=3, disagree=2 and strongly disagree=1) and was coded into a numerical value. Scores were summed and reported as a percentage. The scoring here was the inverse of the system used to determine levels of knowledge. A higher score reflected intolerance to HIV/AIDS infected patients. A positive attitude was considered as a professional attitude. Here, the higher score implied a negative attitude, >75%: negative; 50-75% passive; <50% positive.

The last section assessed the infection control practices of the clinical students in the same manner as the section on knowledge levels (2nd section). A higher score meant higher levels of practice levels, >75%: was regarded as excellent practice levels; 50-75% good levels of practice; 25-50% moderate practice levels; <25% weak levels of practice (5). This section was made up of four questions. We are aware that this manner of assessing infection control practices was not ideal and should be assessed by observing rather. However, due to various reasons this was not possible and was noted as a limitation of this study.

The procedure of the study was explained and the participants were informed of what the study entailed and its implications. The students had to consent and could at any stage opt to be excluded from the study and the questionnaire did not record names or student numbers. The only information about the student that was recorded was the gender and year of study. Once completed, the questionnaire was placed in a sealed envelope and collected by the researcher and these were stored in a locked room.

3.5.2 Validity

Validity refers to extent to which the measurement instrument (questionnaire) measures what it is supposed to measure (Kolisa, 2009).

In the case of this study a variety of questions relating to several aspects of knowledge was assessed, e.g. mode of transmission of HIV/AIDS, oral manifestations and others.

Content validity refers to how accurately an assessment or measurement tool taps into the various aspects of the specific construct in question. In other words, do the questions really assess the construct in question, or are the responses by the person answering the questions influenced by other factors (Content Validity: Definition, Index & Examples).

This is referred to content validity of the questionnaire. Attempts were made to design questions/statements in a manner that would be comprehensive to the students and in a manner that would be simple to answer, i.e.correct or incorrect. The aim of the survey was not to replicate a test/ exam situation, the idea was to ensure content validity of the questionnaire being utilised in this study. Additionally, the validity of the questionnaire has been confirmed by numerous researchers Sadeghi&Hakimi, (2008), Oliveira, (2002), McCarthy& MacDonald,(1999), Hu et al, (2004), Alsamghan, (2012), Maimaiti, (2010), Cohen et al, (2005), Pagliari et al, (2004), Mathabathe, (2006).

3.5.3 Reliability

Reliability deals with the measurement of the instruments dependability. If the measurement is dependable it means that it gives the same results each time the same variable is measured. The responses provided from the questionnaire should not vary as a result of characteristics of the instrument. The questionnaire should provide the same response when applied in different time periods. This current study was piloted to 10 students that were not involved in this study. This was conducted to test consistency and to ensure that the questions made sense when being answered by an individual. Additionally, due to the questionnaire being validated by numerous other studies; the reliability was tested by the previous authors and researchers. The questionnaire was adapted from Sadeghi &Hakimi, (2008), Ryalat et al, (2011), Jain et al, (2008) and Mathabathe, (2006) and had a high degree of internal consistency as indicated by Cronbach's alpha correlation coefficient (a=0.67) Sadeghi &Hakimi, (2008), whilst others used the split-half test-retest method to ensure good instrument reliability, by assessing the consistency of a measure from one time to another Ellepola et al, (2011), Jain et al, (2008) and Mathabathe, (2006).

3.5.4 Data and Statistical Analysis

The collected data was verified and coded prior to computerized entry. The researcher utilized Microsoft Excel spreadsheet for data entry and descriptive analysis and thereafter, imported onto STATA 13 for further analysis.

The base line characteristics of the participants were described using frequency, percentage, tables and graphs. These included age and gender of the participant and their group (pre-clinical or clinical).

3.6.1 Analysis by objective:

To achieve objective 1: To determine the knowledge levels, attitude and infection control practices among the Oral Health students regarding patients with HIV/AIDS.

Data was checked for normality using the Kolmogorov-Smirnov analysis and the distribution was found to be uneven. Therefore median and inter quartile range were utilized to report the knowledge, attitude and practice scores.

To achieve objective 2: To determine if there was a correlation between the knowledge and attitude of the students. Pearson's co-efficient of correlation was utilized to assess the magnitude of the linear relationship between the knowledge and attitude of the students. This relationship is demonstrated graphically in the results section of this report (Figure 6)

To achieve objective 3: To compare the KA (knowledge and attitude) between students in the pre-clinical vs. clinical years and BOHSc vs BDS students.
The Pearson's Chi square test was used to compare KA scores between the two groups of students.
A p-value of less than 0.05 was adopted for statistical significance.

3.6.2 Independent variables

The independent variable that was analysed during the research project was the demographic profile and included the age, gender & year of study of each participant.

3.6.3 Dependent variable

The dependent variable that was analysed in the research was identified as knowledge levels, attitude levels and levels of infection control practices.

3.7 Ethical Considerations

Permission to undertake the current study was granted by the University of Witwatersrand Human Research Ethics Committee and the ethics clearance certificate is attached as Appendix II (Ethics Clearance Certificate number M150609).

A permission letter (Appendix III) was obtained from the Head of the dental school, the dean of the students (Appendix IV) and information sheet for the participating student (Appendix I).

CHAPTER 4: RESULTS

This chapter presents the main findings of the study.

4.1 Demographics

The study sample consisted of 108 undergraduate dental students, who were recruited as mentioned in the previous section, as a purposive sample to complete the questionnaire.

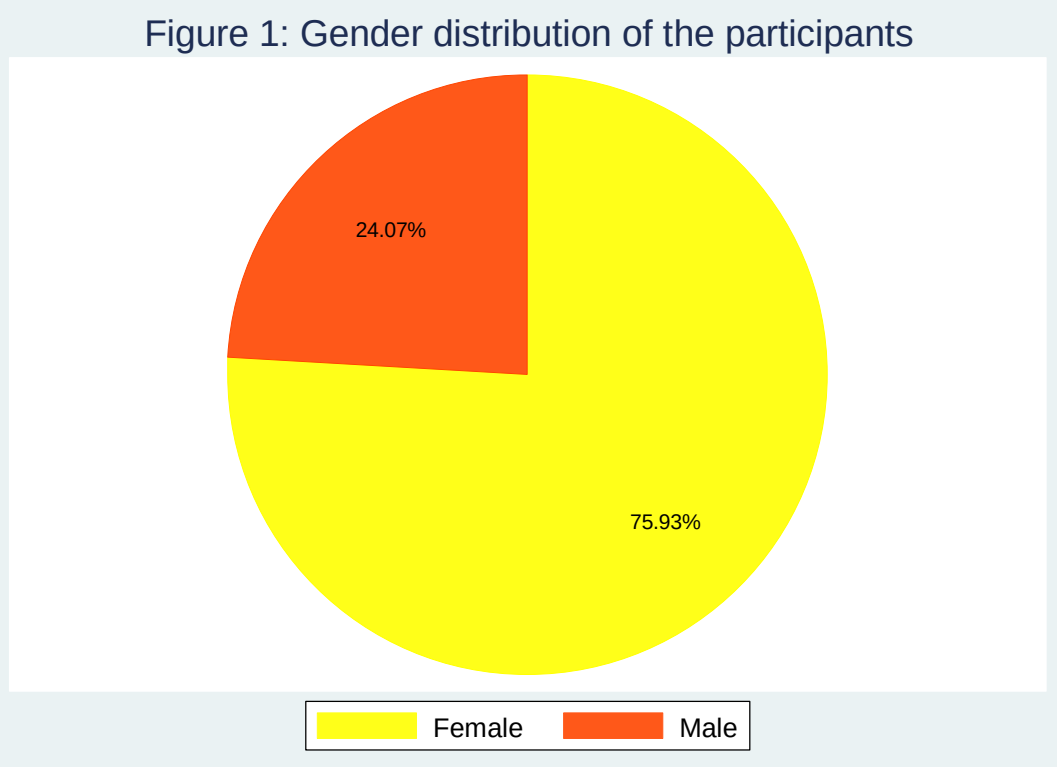
A total population of 108 students were interviewed, with a response rate of 75 % (108/144), 82 (75.93%) were females as opposed to 26 (24.07%) males. The two groups were unevenly distributed with almost 2/3 (66%) of clinical students compared to 34% pre-clinical students.

4.1.1 Distribution by levels of study

Table 1: Demographic characteristics of participants

Demographic characteristics	n	%
Age in years median(IQR)	21 (20-23)	
Gender		
Female	82	75.93
Male	26	24.07
Levels of study		
Preclinical	37	36.26
BDS1	14	
BDS2	23	
Clinical	71	65.74
BOHSc I	10	
BOHSc II,	9	
BDS3	18	
BDS4	19	
BDS5	15	

4.1.2 Distribution by gender



4.2 Levels of Knowledge among the students

The average knowledge level of students regarding HIV/AIDS was approximately 55% with a standard deviation of 0.15; the median was 0.55 with a min-max value of (0.2-1.0). [Table2]. Twenty nine per cent of the students (31) had a moderate knowledge level regarding the management of HIV/AIDS patients (Figure 2).

As seen on the graph below (Figure 2), more than half (59.26%) of the students have good knowledge levels when managing HIV/AIDS patients presenting at the Wits Oral Health Centre.

Of these 31 students with moderate knowledge 24 (77.42%) were females against 7 (22.58%) males (Figure 3). Thirteen per cent of the students had an excellent knowledge.

Figure 3 below portrays the level of knowledge across genders, showing no statistical difference between the two ($p>0.05$). This implies that the proportions of females and their male counterparts in each knowledge category were fairly equal ($p=0.85$) as regards their level of knowledge.

4.3 Attitude levels among the students

Figure 4 below depicts the level of attitude found among all the dental students (pre-clinical and clinical). Just over half (55.56%) of the students had a positive attitude, 44(40.74%) had a passive attitude and 4(3.70%) students had a negative attitude. Due to the uneven distribution of attitude scores, median and interquartile range (IQR) was used to describe it. Of the sample, 50% of participants had an attitude score (avg) of 45, with a standard deviation of 0.10, with median of 0.45 with a min-max value of (0.28-0.8).

Objective 1: Assessment of Knowledge, attitude and infection control practices

Table2: Levels of Knowledge, Attitude & Practices

Knowledge Score (Average) (std) **(median)(min-max)** **Total sample(n=108)**		55% (0.15) 0.55 (0.2-1.0)
	N	%
Weak Moderate Good Excellent	0 31 64 13	0 28.70 59.26 12.04
Attitude Score (avg)(std) **(median)(min-max)**		**45% (0.10)** **0.45 (0.28-0.8)**
	N	**%**
Positive	60	**55.56**
Passive	44	**40.74**
Negative	4	**3.70**

Practice (avg)(std) **(median)(min-max)** **(Clinical students only)** **n= 71**		**78.87%(0.12)** **0.75(0.5-1.0)**
	n	**%**
Good	53	**75.71**
Excellent	17	**24.29**

Figure 2: Levels of knowledge of total study population

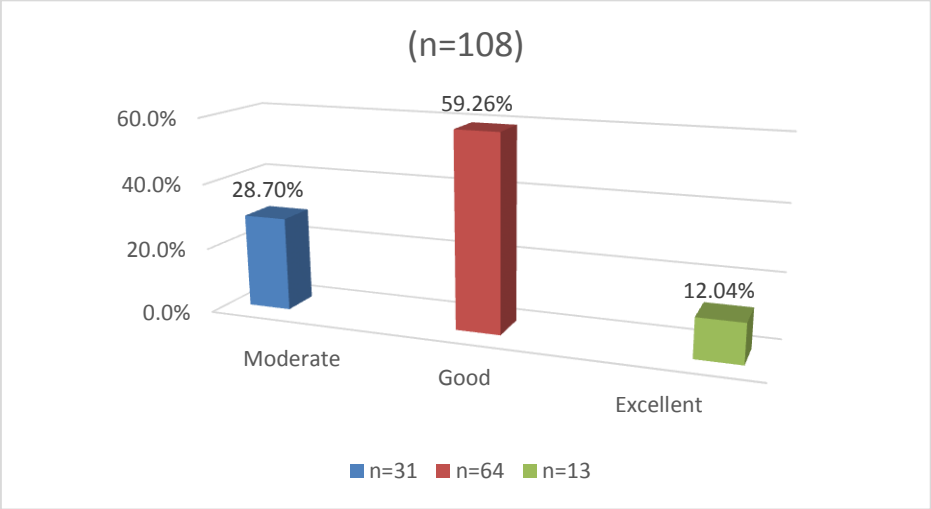


Figure 3: Levels of knowledge by gender

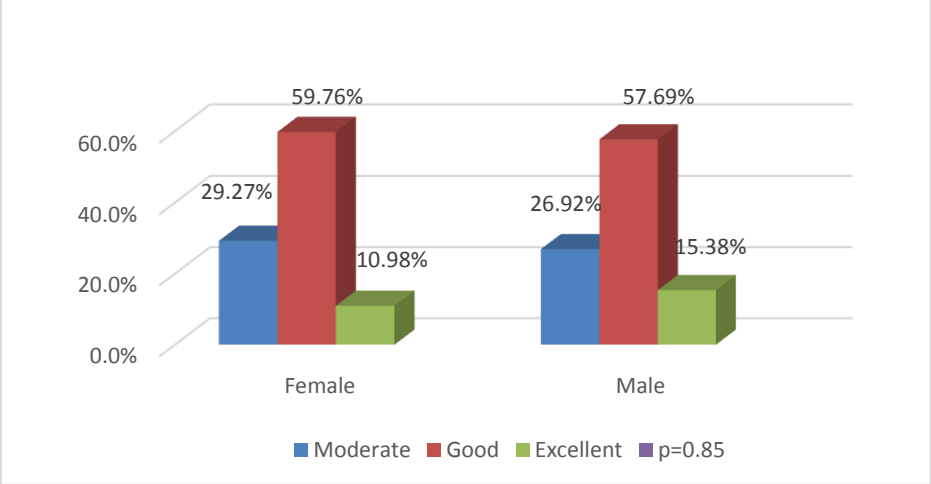
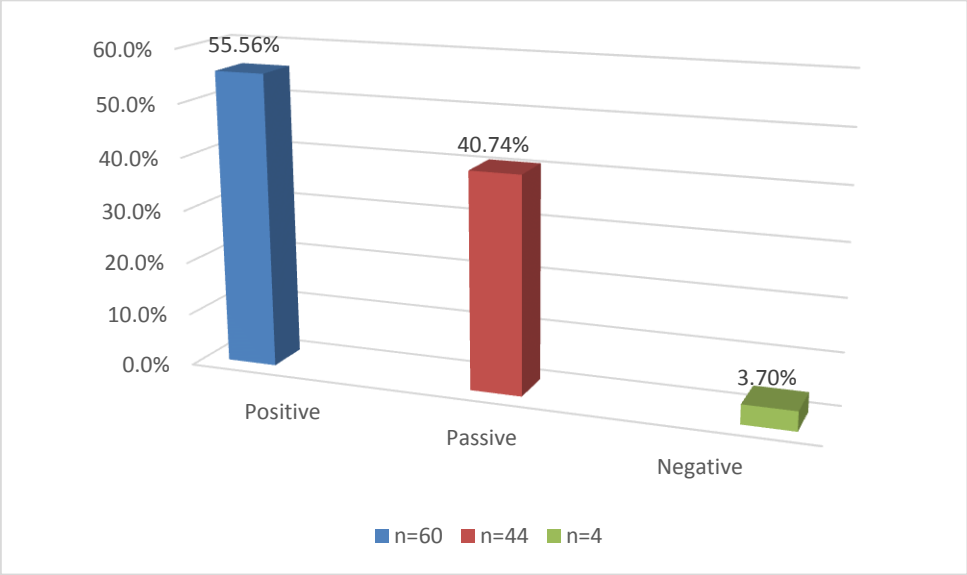


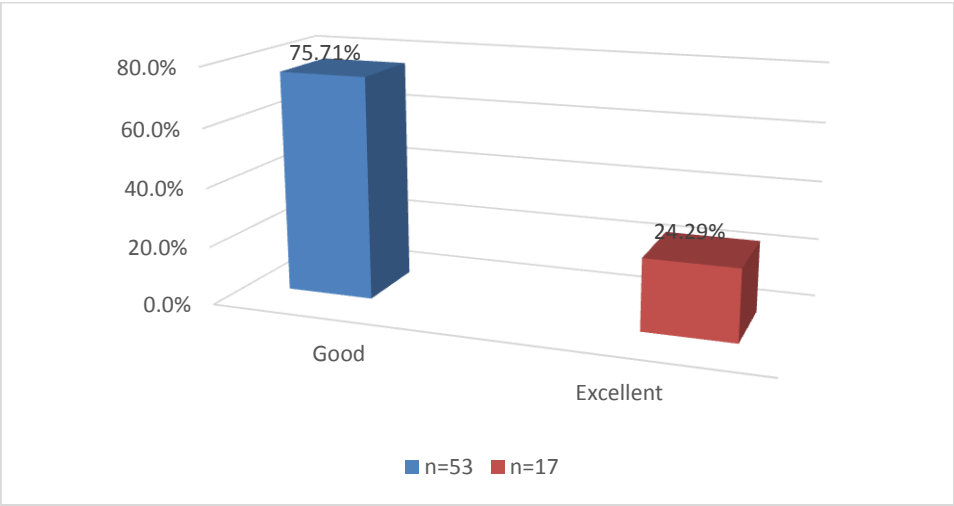
Figure 4: Levels of attitude among the study population



4.4 Level of infection control among clinical students

In general, the infection control practices were of a good/acceptable quality among the clinical students, with an average of 78.87% (std:0.12). The median was 0.75 with a max-min of (0.5-1.0) Three quarter 53 (76%) of these students had good infection control practice and 17(24%) students had excellent infection control practices. (Figure 5)

Figure 5: Levels of practice among students at the clinical level

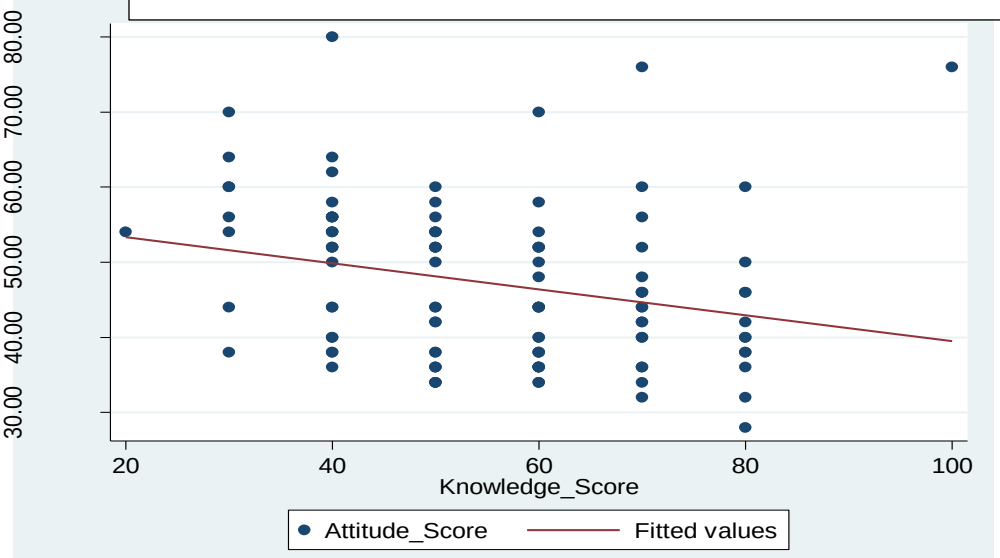


4.5 Correlation between levels of knowledge and attitude among the students

Objective 2: Correlation between Knowledge and Attitude levels of the Dental students

The investigation of the correlation between knowledge and attitude of the student was undertaken, using Pearson product-moment correlation coefficient. Findings demonstrated a significant weak negative linear relationship between the attitudes students adopted and their knowledge (r: -0.17; p= 0.01). This suggested that an increased knowledge affected the attitudes of students negatively toward HIV/AIDS patients. Figure 6 below clearly portrays such a relationship. At baseline, ignoring the effect of knowledge on attitude, a student would have an attitude score of 47%. However, when adjusting for the effect of knowledge, the attitude score would decrease by 0.17% for each incremental increase in the knowledge score, which is described by the fitted line on Figure 6 with a negative slope.

Fig6: Correlation between Attitude and Knowledge Scores



4.6 Comparison between pre-clinical and clinical students

Objective 3: Comparison of KA (knowledge& attitude) between Pre-Clinical and Clinical students

As presented in table 3 below and shown in figure 7 below, there was a statistically significant association (p=0.03) between knowledge levels of the pre-clinical students and the clinical group. For instance, 51% of the pre-clinical students had a good knowledge level compared to nearly two thirds (63%) of the clinical students. Moreover, the proportion of students with excellent knowledge was higher (15%) among clinical students compared to pre-clinical students (5%).

Table 3: Comparison of KA (knowledge and attitude) between Pre-Clinical and Clinical students

	Pre-clinical n	 %	Clinical n	 %		
	37	34.3%	71	65.7%		
Knowledge levels						
Weak	0	0	0	0		
Moderate	16	43.2%	15	21.10%		0.03
Good	19	51.4%	45	63.40%		
Excellent	2	5.41	11	15.5%		
Attitude						
Positive	17	45,9%	43	60,5%		
Passive	18	48,6%	26	36,6%		
Negative	2	5,4%	2	2,8%		

Figure 7: Knowledge levels by clinical levels

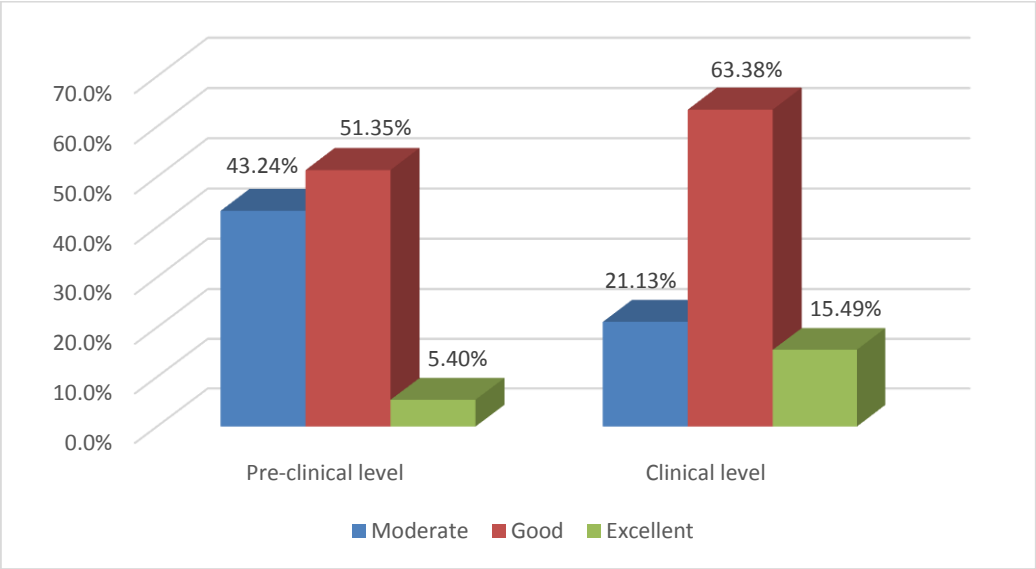


Table 4: Assessment of Knowledge-response to specific questions

	Pre-clinical	Clinical
A:Infection control methods for Hepatitis B provide adequate protection against the transmission of the HI virus	(26/37)70%	34/71(48%)
B: Salivary gland enlargement is associated with a patient infected with HIV	(29/37)78.3%	(23/71)32%

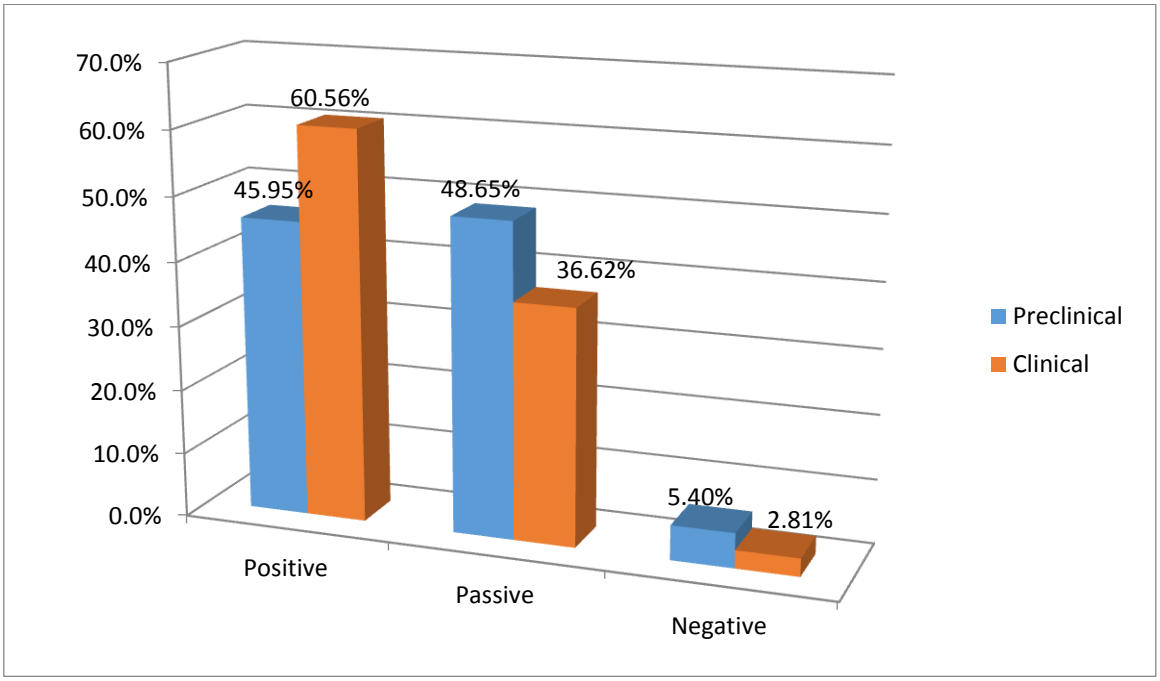
Table 4 above represents the proportion of students who demonstrated knowledge or lack thereof, when asked the above questions. An interesting finding, was that when assessing the knowledge levels of the dental students, 70 % of the pre-clinical students and 48% of the clinical students were not aware that the same infection control measures used to protect a clinician from becoming infected with Hepatitis B could be effective for protection against HIV/AIDS.

Another point to consider was that when the students were asked about the association between salivary gland enlargement and HIV infection, 78.3% of the pre-clinical students were not aware of this compared to 32% of clinical students (Table 4).

However, the study showed no statistically significant ($p=0.31$) difference between pre-clinical and clinical students with respect to their attitudes regarding HIV/AIDs patients attending Wits Oral Health Centre.

For instance, Figure 8 below shows that approximately 5% of the pre-clinical students had a negative attitude compared to the almost 3% negative attitude among the clinical group. The differences between the pre-clinical and clinical groups observed in the proportion of those with positive and passive attitude was also not significant p-value ($p= 0.31$).

Figure 8: Attitude levels by clinical levels



However, it should be noticed that such a crude analysis might hide some disparities. For instance, a stratified analysis (as presented in figure 9 below) by gender reveals that among females there was a significant association between attitudes and groups (p= 0.04).

Figure 9: Attitude levels among females

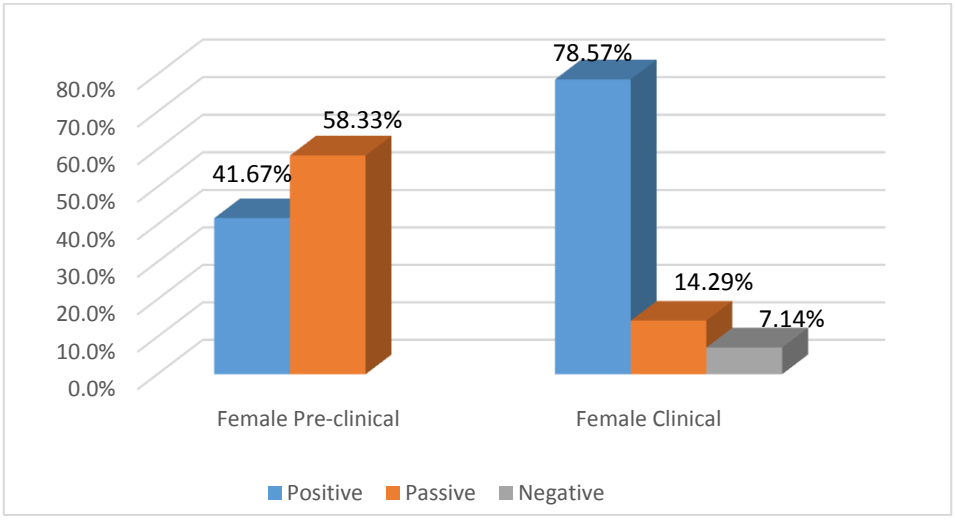


Table 5 below, demonstrates the responses to specific questions that assessed the attitude of students, with regards to their moral and professional responsibility to treat patients with HIV/AIDS, 92% of the pre-clinical and 94 % of the clinical students, either strongly agreed or agreed to this. When questioned about whether patients with HIV/AIDS should be treated at a separate ward, 54 % of the pre-clinical and 24% of clinical students answered to being neutral agree and strongly agree. When asked about whether they felt that dentists have a right to know a patients HIV status both groups agreed by answering a neutral, agreeing and strongly agreeing to this, with 76% among the pre-clinical and 91% among the clinical students. This is incorrect, as an individual who has been diagnosed with HIV/AIDS is not obligated to divulge this information (Sadeghi&Hakimi, 2008), usually out of fear of victimisation and the possibility of being denied dental treatment.

Table 5: Assessment of Attitude: response to specific questions

	Pre-clinical	Clinical
A:It is my moral and professional responsibility to treat patients with HIV/AIDS	(34/37)92%	(67/71)94%
B:HIV/AIDS patients should be treated at a separate ward	(20/37)54%	(17/71)24%
C:Dental practitioners have a right to know their patients HIV infection status	(28/37)76%	(65/71)91%

When comparing the knowledge, attitude and practice (KAP) levels of the dental students (n=52) and oral hygiene students (n=19), the findings were interesting. Figure 10 below demonstrates the difference in knowledge levels between the Oral Hygiene (BOHSc I&II) students and dentistry students (BDS3, 4&5). Clearly the oral hygiene students had a slightly higher knowledge level compared to the dental students, however this was not significant (p=0.63).

Figure 10: Comparison of knowledge levels- BOHSc vs. BDS Clinical students

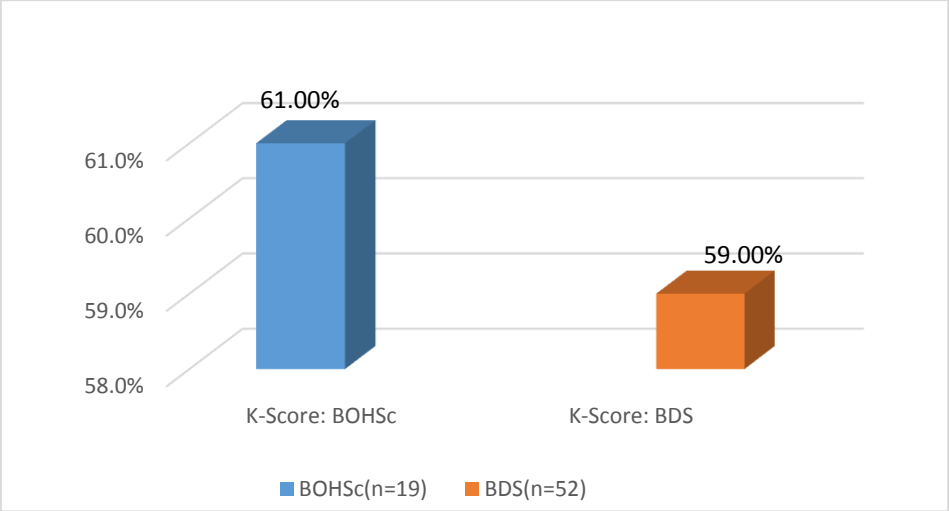


Figure 11 below demonstrates that there was a slightly more positive attitude among the Oral hygiene students compared to the dentistry students, however this was not statistically significant (p=0.19).

Figure 11: Comparison of Attitude levels- BOHSc vs. BDS Clinical students

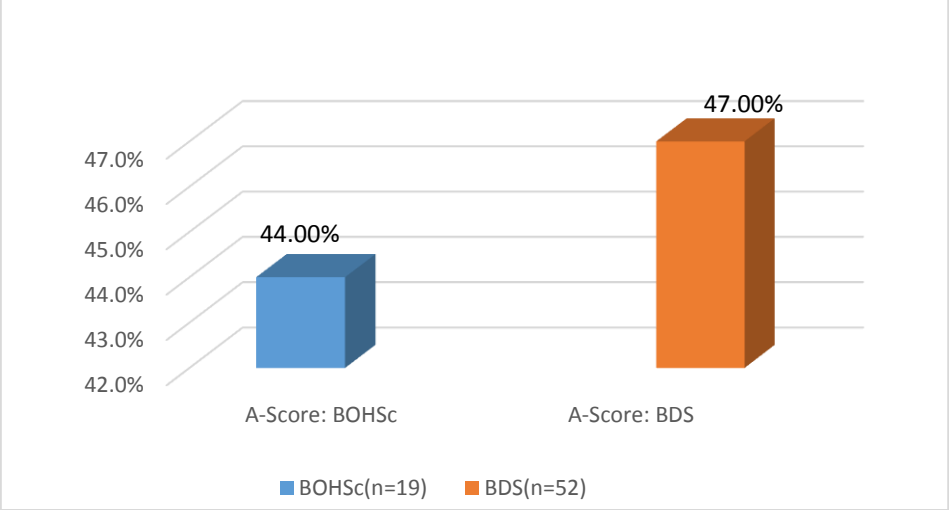
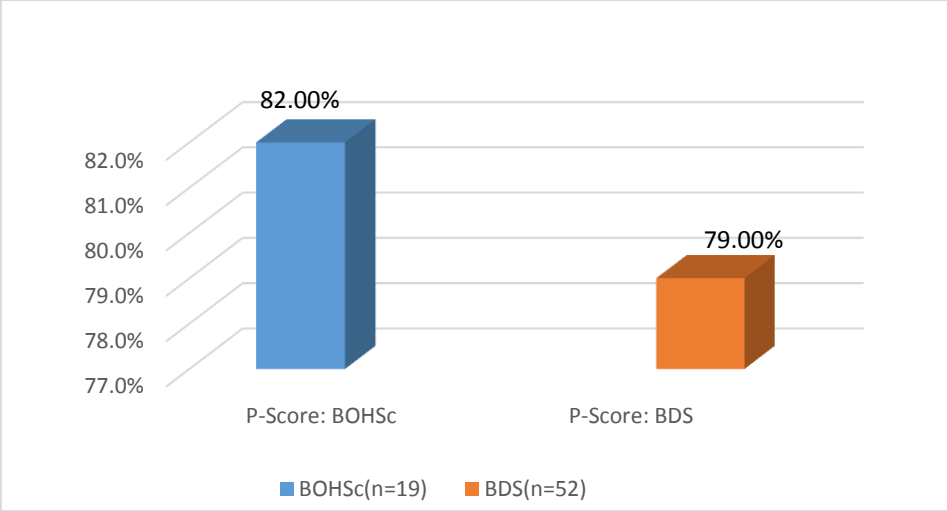


Figure 12 below demonstrates that with regards to infection control practices the oral hygiene students scored higher compared to the dentistry students. However, this was not statistically significant (p=0.49).

Figure 12: Comparison of infection control practice levels- BOHSc vs. BDS Clinical students



CHAPTER 5: DISCUSSION AND CONCLUSION

This cross-sectional study on the Knowledge, Attitude and infection control practices of dental students when managing patients with HIV/AIDS has been undertaken at the two other dental Universities in South Africa, i.e. The University of Western Cape and MEDUNSA, currently renamed Sefako Makgatho Health Sciences University (SMU). This study has yielded profoundly interesting results compared to the literature and the other South African Universities and will be discussed in this section in detail.

5.1 Demographic Profile

This study cohort had a mean age of 21 years (20 - 23) and the majority were females (76%). The bias towards more females in dental schools is a worldwide trend and is seen among a majority of the cited papers used in the literature review section (Sadeghi& Hakimi, 2008).

5.2 Levels of Knowledge, Attitude & Infection Control Practices

This study in comparison to the published literature found some similarities and some disparities. The following studies utilised the same validated questionnaire used in this current study and reported surprisingly different results**. (Table 6)**

5.3 Comparison between this current study and other published related KAP studies

Table 6: Comparison of this study to other published KAP studies utilizing the validated questionnaire with or without modification (Sadeghi& Hakimi, 2008) (Seacat et al, 2003) (Hu et al, 2004) (Patil&Goel, 2011) (Shailee et al, 2013) (Ryalat et al, 2011) (Alsamghan, 2012)

Author	Country	Findings	Similarity	Differences
Seacat et al, (2003)	**USA**	**Mean age- not mentioned, Gender = m (45.3%) vs. f (54.6%)** **1. Knowledge scores of dental students (4.42) were significantly higher that hygienist scores (3.70).** **2. Males had significantly more negative attitude.** **3. Knowledge scores were correlated with an increased sense of dental professionalism.**		**A majority 64(59%) had a good level of knowledge.** **2. The attitude score was found to be 45 (38 - 54), 60(55%) was positive.** **3. An increased knowledge affected the attitudes of students positively.**
Hu et al, (2004)	**Taiwan**	**Mean age=21.9, gender=m (59.3%), f (40.7%)** **1. Self -reported knowledge rated as "bad/very bad" was 17.5%.** **2. Only 49% of respondents were willing to treat patients with HIV/AIDS.**	**1. Knowledge score was found to be 55.46% and a majority 64(59%) had a good level of knowledge.**	**Dental students only(n=1050)** **1. A majority 64(59%) had a good level of knowledge.** **2. The attitude score was found to be 45 (38 - 54), 60(55%) was positive.**
Sadeghi&Hakimi. (2008)	**Iran**	**Mean age=not mentioned, gender= f (65.4%)** **1. The total mean knowledge score was 82.1 %(Excellent).** **2. The total mean attitude**		**1.Dental students only (n=455)** **2.The attitude score was found to be 45 (38 - 54), 60(55%) was positive** **3. An increased**

		score was 57.4%(negative) **3. Higher knowledge scores had significantly more positive attitudes.(p=0.001)**		**knowledge affected the attitudes of students negatively.**
Ryalat et al, (2011)	**Jordan**	**Mean age=20.6 vs. 22.7) gender=m (26%), f (74%)** **1.Adequate level of knowledge** **2. Significantly more 3rd year (pre-clin)(39.2%)than 5th year (clinical)(26.3%)students reported that they were unwilling to treat patients with HIV/AIDS**		**1. A majority 64(59%) had a good level of knowledge. 29% of the students had a moderate knowledge about the management of HIV/AIDS patients.** **2.Pre-clinical-92% and clinical-94% were willing to treat patients with HIV/AIDS**
Patil et al, (2011)	**India**	**Age= 20-24yrs, gender= m vs. f(1:3)** **1. Total mean knowledge score was 76.5%(Excellent).** **2.Overall mean attitude score was 62.9%(negative)**		**A majority 64(59%) had a good level of knowledge.** **2. The attitude score was found to be 45 (38 - 54), 60(55%) was positive.**
Alsamghan, (2012)	**Saudi Arabia**	**Mean Age= 23.6, gender=100% males** **1. Total mean knowledge score was 62.7 %(good).** **2. Overall mean attitude score was 66.4 +-6.8%, 90.1% negative.** **3. Students with higher knowledge scores had significantly more positive attitude(p<0.001)**		**A majority 64(59%) had a good level of knowledge.,** **2. The attitude score was found to be 45 (38 - 54), 60(55%) was positive.** **3. An increased knowledge affected the attitudes of students negatively**
Shailee et al, (2013)	**India**	**Age=not mentioned, gender= m(28.1%) f(71.9%)** **1. Total knowledge score was 68.3 %(good**		**1. A majority 64(59%) had a good level of knowledge.** **2. Pre-clinical-92% and clinical-94%**

		knowledge). **2. The mean knowledge score was statistically higher in the clinical group than the pre-clinical group. Overall attitude score was significantly higher in the clinical group compared to pre-clinical group. The overall attitude score was 65.6%(negative)** **3. Only 4.9% had professional attitudes, with males having less negative attitude.** **4. The higher the knowledge scores were, the more positive was their attitude.(p=0.03)**		**were willing to treat patients with HIV/AIDS.**

Table 7: Comparison of this current study to other published KAP studies that did not utilize the validated questionnaire (Erasmus et al, (2003) , Shaikh H, (2011) , Shan et al, (2011) Ellepolla et al, (2011), Peeran& Ramalingam, (2015) , Premadasa et al, (2015) , Azodo et al, (2010))

Author	Country	Findings	Similarity	Differences
Ellepolla et al, (2011)	**Kuwait**	**1. Total mean knowledge score was 45.23. with 58% of students with high levels of knowledge** **2. Total attitude score was 5.36, where a majority of the students (63.6%) displayed a negative attitude.**	**Gender bias- (m=8, fem= 47)**	**1. Knowledge score was found to be 55.46% and a majority 64(59%) had a good level of knowledge.** **2. The attitude score was found to be 45 (38 - 54), 60(55%) was positive.**

Premadasa et al, (2015)	**UAE**	**Mean age= not mentioned, gender= m (25%) vs. f (75%)** **1.Overall knowledge score was 39.5** **2. Attitude score was 14 out of 24 with no significant gender differences and years of study.** **3. Although the levels of knowledge of the senior students were higher than the first years, the negative attitudes remained largely unchanged.**		**1. Knowledge score was found to be 55.46% and a majority 64(59%) had a good level of knowledge.** **2.The attitude score was found to be 45 (38 - 54), 60(55%) was positive**
Erasmus et al, (2003)	**South Africa**	**Mean age=21.66, gender- not mentioned** **1. increased level of knowledge as the students progressed through the curriculum;** **2. A majority of the students (79%) felt that HIV/AIDS patients should be treated at any dental facility and they are entitled to the same respect and dignity as other patients,** **3. Protective eyewear was worn less by dentistry students than oral hygiene students**	**87% of the students agreed or strongly agreed that HIV/AIDS patients should be treated at any dental facility and not isolated in a separate ward.** **3. The level of infection control practise was higher among the Oral hygiene students compared to dentistry students(82% vs79%), although not statistically significant.**	
Azodo et al, (2010)	**Africa**	**Age=25-30yrs, gender= m vs. f(1.6:1)** **1.HIV related knowledge was reported as high by only 31% of**		**A majority 64(59%) had a good level of knowledge, 29% of the students**

		respondents, 56.9% reported adequate knowledge **2.Among the 58 students, 50 of them reported good infection control practices.** **3. Of the students, only 58.8% expressed a willingness to treat these patients.**		**had a moderate knowledge about the management of HIV/AIDS patients.**
Shaikh H, (2011)	**India**	**Mean age 19.74, gender= m(64), f(171)** **1.A majority (76.6) had moderately adequate knowledge levels, only 0.9% had an inadequate level of knowledge** **2. A majority of the students(90.7%) were willing to treat these patients.**	**1. Pre-clinical-92% and clinical-94% were willing to treat patients with HIV/AIDS**	**1.29% of the students had a moderate knowledge about the management of HIV/AIDS patients.**
Shan &Bala, (2011)	**India**	**Age= not mentioned, gender= m(79), f(71)** **1. The overall general knowledge score was low, 9.73.** **2. Only 12% of the students thought that HIV/AIDS patients should be treated in a public dental facility.** **3. Only 62 % of the students were aware of universal precautions. Only 29% of the students utilized protective eyewear.**		**A majority 64(59%) had a good level of knowledge,**
Peeran&Ramalingam, (2015)	**Libya**	**Mean age- not mentioned, gender-males (24<23.9%>) &females (77<76.1%>)** **1. More than half of the students considered themselves as not having adequate knowledge about HIV.** **2. Despite the inadequate levels of knowledge, the students had a positive attitude towards HIV patients.**	**Female gender bias (76.1% vs.23.9%)**	**A majority 64(59%) had a good level of knowledge,**

This study had determined the knowledge levels to be an average of 55% (SD 0.15), due to the abnormal distribution of the data, the median and min-max values were calculated. The median was 0.55 with a min-max value (0.2-1.0), just over half of the students, 64(59%) had a good level of knowledge, with 12% having excellent level of knowledge.

With regards to attitude levels, the average attitude score was 45% (SD 0.10), with a median of 0.45, with a min-max value of (0.28-0.8), with more than half 55.56% having a positive attitude and 40 % having a passive attitude. The correlation between the knowledge levels and attitude reported that, an increased knowledge affected the attitudes of students negatively, as the knowledge levels increased there was a more negative attitude demonstrated.

The infection control practice levels among the students was found to be 78.87 %(SD 0.12), which is regarded as an "Excellent" level of practice with a median of 0.75 and min-max value (0.5-1.0), with 75,7% having a good level of practice.

When asked on their willingness to treat these patients, 92% of the pre-clinical students and 94% of the clinical students felt that it was their moral responsibility to treat patients with HIV/AIDS.

When compared to some studies that utilised the same questionnaire; Sadeghi & Hakimi, (2008) found that among Iranian 455 students, the total score was 82.1 %; this was regarded as excellent knowledge levels. Their results showed a mean attitude score of 57.4% which was regarded as a negative attitude.

The Iranian students with higher knowledge scores had a significantly more positive attitude towards HIV/AIDS patients (Sadeghi & Hakimi, 2008). As compared to this current study, which found a negative correlation between the knowledge levels and attitude, as the knowledge levels increased there was a more negative attitude demonstrated (Sadeghi & Hakimi, 2008).

To investigate the difference in results between these two studies; this current study and Sadeghi & Hakimi, (2008), we could suggest the differences in cultural background and beliefs of the people in Iran as compared to the population of South Africa. This is one factor that could have contributed to this trend among the South African students. In addition, there

is a huge difference in the prevalence of people living with HIV/AIDS in South Africa when compared to the population of Iran; hence students in South Africa are more likely to have a greater rate of exposure to patients with HIV/AIDS, creating fear of the disease and of contracting it, when compared to the students in Iran. Comparatively, this increase in exposure to those infected could also result in a decreased level of fear, a possible sense of acceptance, acknowledgement and comfort of the disease. Attitude factors significantly associated with the willingness to treat these patients were the following: ability to treat infected patients safely, feeling morally responsible, and believing that HIV/AIDS patients can live with others in the community (Sadeghi & Hakimi, 2008).

Most respondents of that study (77.9%) had no previous professional contact with HIV/AIDS patients. This fact was of great concern to their educators, due to the increasing rates of HIV infection, globally. Overestimation of the transmission risk of HIV seemed to be the most important reason for being afraid of providing dental care to HIV/AIDS patients. The students fear may have been overpowering their intellectual and practical ability to manage these patients efficiently (Sadeghi & Hakimi, 2008).

It was a concern that the HIV/AIDS situation in Iran may have been more serious than published data indicated, and the main concern was the potential spread of infection from injecting drug users to the general population (Tavoosi, 2004).

The strategic geographic situation of Iran and its long borders with the countries of the Golden Crescent (Afghanistan and Pakistan), which produces a substantial proportion of the world's heroin, have confronted Iran with the problems of drug trafficking and concomitant drug addiction within the country (Tavoosi, 2004).

Due to the unreasonable fears among most Iranian people, led to the opinion that AIDS education may promote a high risk behaviour and had no place in schools and universities in Iran (Tavoosi, 2004).

Accordingly, the current HIV/AIDS situation and the fact that antiretroviral drugs are not affordable and available for treating, large numbers of HIV-positive individuals make primary prevention of HIV infection seem like the most important concept in controlling the epidemic (Tavoosi, 2004).

HIV/AIDS education brings to light a host of topics shrouded in cultural taboo. Sex outside of marriage violates basic Islamic teachings, homosexuality is regarded as an illegal offence, and there is a controversy regarding the use of the word 'condom' in HIV/AIDS prevention efforts However, reports by the Iran Youth Organization recently warned of a rise in drug use and 'social rebellion' among young people (Yazdi et al, 2007). Studies of drug use among Iranian students suggested that one third have tried street drugs and 2% have tried heroin. Although sexual contact is the second most common method of HIV transmission in Iran, HIV researchers have faced restrictions in assessing the prevalence of sexual behaviours (Yazdi et al, 2007). Thus, HIV education is of particularly importance in the context of a changing socio-cultural fabric and increased HIV infection among youth in the region of Iran (Yazdi et al, 2007).

These are some of the reasons that could have contributed to the negative attitude that the Iranian students had towards patients with HIV/AIDS.

The widespread stigmatisation of sex in South Africa and President Mbeki's well publicized refusal to acknowledge the extent of the AIDS issue have been linked to the president's project of post-apartheid nation building and to his conception of the type of citizen best equipped to carry forward his vision of an " African Renaissance" (Campbell et al, 2005). AIDS, and its association with promiscuous and diseased sexuality, threatens to confuse the distinction between a wretched past and a bright new post-apartheid future. Public discourses and silences regarding sexuality are embedded in a "wider matrix of moral anxiety, social instability and political contestation", characterizing the current historical moment in South Africa, where people battle with "the complexities and vulnerabilities of the drive to produce a newly democratic unified nation" (Campbell et al, 2005).

The hardship for those infected and their families begins long before people die. Stigma and denial related to suspected infection cause many people to delay or refuse testing; fear and despair often follow diagnosis, due to poor-quality counselling and lack of support; poverty prevents many infected people from maintaining adequate nutrition to help prevent the onset of illness; limited access to clinics, waiting lists for ARV treatment programmes and eligibility criteria for access to ARVs (UNAIDS, 2011).

This may have contributed to many people becoming seriously ill before accessing treatment. Additionally, the loss of income and support when a breadwinner or caregiver becomes ill, and the diversion of household resources to provide care exacerbate poverty; the burden upon family members, particularly children and older people caring for terminally ill adults, and the trauma of bereavement and orphan hood (UNAIDS, 2011). This may lead to a compromise of the physical and mental well-being of entire households, where 2,100,000 children orphaned due to AIDS in South Africa in 2011 (UNAIDS, 2011).

This all happens in a society where the majority of children live in poverty and 25% of the economically active population is unemployed, with women face a greater risk of HIV infection (UNAIDS, 2011).

On average in South Africa there are three women infected with HIV for every two men who are infected. The difference is greatest in the 15-24 age groups, where three young women for every one young man are infected (UNAIDS, 2011).

However, South Africa has made positive strides in managing the HIV and AIDS epidemic since the end of 2008. The numbers of people on antiretroviral treatment has increased dramatically to 1 900 000 and there were 100 000 fewer Aids-related deaths in 2011 than in 2005 (UNAIDS, 2011).

The epidemic itself is more freely spoken about in communities, schools as well as universities. The face of HIV as a chronic disease has changed as a result of advances in HIV treatment in the last three decades. Combination ART (HAART) improves health, prolongs life and substantially reduces the risk of HIV transmission. In both high and low income countries, the life expectancy of HIV-infected patients who have access to ART is now measured in decades (Deeks, 2013).

Another study that could be compared is, Ryalat et al, (2011) who found that among a cohort of 211 students in Jordan, there was an adequate knowledge level regarding most categories of knowledge that was assessed, even though some inadequacies were noted with regards to the transmission of the disease. This study did not report on the knowledge score, however they did report on each category of knowledge assessed. For example, they reported on the

assessment of oral lesions, the association of oral candidiasis and oral hairy leukoplakia with HIV was known by a higher proportion of fifth year compared to third year dental students. However, 56.7% of the third year students thought that Kaposi Sarcoma was exclusive to HIV/AIDS. This study did not further investigate the possible correlation between knowledge levels and attitude of the students, a reason for this was not provided for by the author. However, 39.2 % (pre-clinical) vs. 26.3% (clinical) students reported that they were unwilling to treat patients with HIV/AIDS (Ryalat et al, 2011).

Among Arab countries, initially the religion of Islam had contributed to limiting the spread of HIV, by promoting family values; male circumcision, prohibition of non-marital sex, homosexuality, intravenous drug use and alcohol. However, due to westernisation, there has been a rapid development of foreign employment from a variety of nationalities, races, cultures and religions. Ease of international transportation and communication are ever increasing, in addition to temptation introduced by media, income changes and decreased influence of family and religion resulting in rapid changes to family, cultural and religious values (Ganczak, 2007). This Arab culture may have significantly contributed to the unwillingness of the students to treat patients with HIV/AIDS

Other studies that were conducted using a differently designed questionnaire, yielded results that also had some similarities and occasional differences. (Please refer to Table 7 above)

Shaikh et al, (2011) found that among 235 students in Bangalore India, 76.6% of the students had a moderately adequate knowledge level and only 0.9% had an inadequate level of knowledge. When compared to this current study, about 29% of the students had a moderate knowledge about the management of HIV/AIDS patients. The attitude levels were assessed using 3 –scales that is Prejudicial Evaluation Scale(PES), Social Interaction Scale(SIS), Attitude-Legal, Personal Risk and Consequences, students were found to have a positive attitude for prejudice(22.6% adequate), a negative attitude was found among the SIS scale (25.5% adequate) and 57.4% adequate attitude among the Legal, personal risk& personal risk consequences. This current study did not utilise these scales, however just over half of the students, 60(55.56%) had a positive attitude. Infection control practices were not taken into account in this study (Shaikh et al, 2011).

There are 24 different dialects spoken by a million or more individuals with seven major religions and six main ethnic groups. The overpopulation of this country severely disables the economy and about a quarter of the population cannot afford an adequate diet, in addition they have the highest number of HIV-seropositive patients globally; a staggering 4.5 million people. The most widespread focus of infection has been detected in the western and southern regions, where the spread is mainly due to the heterosexual route from sex workers and their clients (Solomon, 2004).

The cultural and traditional diversity of this country and the consideration of topics pertaining to sex as taboo also hinder work related to HIV/AIDS. Due to stigmatization, discrimination and the attitudes of health workers in specific settings; many patients access care and treatment from sources other than government institutions (Solomon, 2004).

Due to the conservative nature of this nation, efforts by policy makers to introduce sex education at schools lack total commitment. Their government has banned the discussion of "condom use" at schools and even universities (Solomon, 2004).

These are some of the major reasons that could have contributed to the negative attitude demonstrated by the students specifically in the social interaction category

(Shaikh et al, 2011).

In Nigeria, Azodo et al, (2010) found that among 58 students, by assessing their self-reported knowledge, 31 % reported high knowledge levels, 56.9% reported adequate knowledge and 12.1% reported low knowledge, when compared to this current study, about 29% of the students had a moderate knowledge about the management of HIV/AIDS patient, however this was assessed by utilisation of a study instrument and was not based on self-reported levels of knowledge. When asked on their attitude toward certain behaviours like homosexuality, 48.2 % had a sympathetic attitude, 20.7% were undecided and 5.2% gave no response. When asked on their willingness to treat these patients, 58.8% of the students expressed a willingness to treat these patients ,in comparison to this current study, 92% of the pre-clinical students and 94% of the clinical students felt that it was their moral responsibility to treat patients with HIV/AIDS. The small sample size of this study (n=58) should be considered as a major factor that could have skewed the actual results, in comparison to the current study (n=108)

(Azodo et al, 2010).

In South Africa, Erasmus et al, (2005) demonstrated that among 150 dental and oral hygiene students, there was an increased level of knowledge as the students progressed through the curriculum; however this applied to the dental students and not the oral hygiene students. The knowledge score was not calculated, however they did report on each category that was assessed for knowledge. For example, 52% of the students reported that the virus could not be transmitted through aerosols produced by a hand piece, however when compared to this current study, 75% of the students reported also that the virus could not be transmitted via aerosols (Erasmus et al, 2005). Perhaps educators need to examine their lecture topics and investigate whether this route of transmission is taught to the students and perhaps modify their teaching to an extent.

A majority of the students (79%) felt that HIV/AIDS patients should be treated at any dental facility and they are entitled to the same respect and dignity as other patients, when compared to this current study, 87% of the students agreed or strongly agreed that HIV/AIDS patients should be treated at any dental facility and not isolated in a separate ward. Eighty six per cent of the students indicated that special precautions should be taken when treating these patients and when compared to this current study, 56% of the students felt that special precautions should be taken when treating patients with HIV/AIDS. Only 31% of all the students reported to be using all barrier techniques when treating these patients (Erasmus et al, 2005). This study also compared the knowledge, attitude and infection control practices between dental and oral hygiene students. Their findings indicated that there was increase in knowledge as the level of study increased with the exception of the oral hygiene program, although not significant. When compared to this current study, an increase in knowledge with the level of study was noted among the clinical dental students and not the oral hygiene students which is similar to what Erasmus et al, (2005) had found. With regards to attitude levels there was no differentiation made between the two groups of students (oral hygiene and dental). Infection control practices among the oral hygiene students was found to be excellent, where 100% of these students reported on wearing gloves, protective eyewear and masks when treating patients, whilst dental students differed in the type of protection worn. Protective eyewear was worn less by dentistry students than oral hygiene students (Erasmus et al, 2005). This finding

is similar to this current study which found that the level of infection control practise was higher among the oral hygiene students compared to dentistry students (82% vs79%), although not statistically significant. Finally, this study found that even though the students had a relatively high level of understanding of HIV/AIDS, there was little if no influence on the attitude and behaviour in managing these patients (Erasmus et al, 2005).

Galane, (2012) found that among the dental students at MEDUNSA (Currently SMU), an average mean knowledge was 15.07(SD 2.48), compared to the current study which had a knowledge score was found to be 55% (SD0.15**)** (and more than half of the sample, 64(59%)) had a good level of knowledge. For attitude among the students (n=120), it was an average mean score 6.89 (SD 3.19). The following distributions of attitude levels among the students were found: 60(55%) was positive, 44(40%) being passive and 4(3.7%) being negative. Black participants obtained a high level of positive attitudes towards HIV/AIDS infected people, than the rest of the groups. (p=0.006), for this current study race and social background was not take into consideration. For infection control practices among the students, the mean score was 28.38 (SD 3.18) (Galane, 2012).
In comparison to this current study, infection control practices among the clinical students were of an average of 78.87% (std: 0.12), with three quarters of the students, 53 (76%) of these students having good infection control practices and 17(24%) students having excellent infection control practices.

5.4 Correlation between Knowledge and Attitude level (Table 6 & Table 7)

This study investigated the correlation between knowledge and attitude of the students using Pearson product-moment correlation coefficient. A significant weak negative linear relationship between the attitudes students adopt and their knowledge (r: -0.17; p= 0.01) was found. This suggested that an increased level of knowledge affected negatively the attitudes of students toward HIV/AIDS patients. These findings seem to be in agreement with Ellepolla, (2011), where there was an increase in knowledge there was an increased level of negative attitude (Ellepolla, 2011).

In comparison to other studies of a similar nature, the following studies found a positive correlation between knowledge and attitude. The Seacat et al. (2003) and (2009) studies

reported that students who had high knowledge levels had lower scores on “negative attitude”(r=-.119;p=.017) and higher scores for “professional attitude”,(r=.098;p=.049)

Sadeghi & Hakimi, (2008), Shailee et al, (2013) and Alsamghan, (2012) concluded that a higher level of knowledge would result in a more positive attitude when treating patients with HIV/AIDS.

In contrast to this, some authors reported that even though the knowledge levels were high, this had little or no influence on the already negative attitudes that students possessed. These were Erasmus et al, (2005), Peeran& Ramalingam, (2015), Premadasa et al, (2015) and Grover et al, (2015).

Galane, (2012) found that gender and practice were found to be significant predictors of knowledge regarding HIV/AIDS (p=0.046). Females were found to be more knowledgeable about HIV/AIDS than males, whilst an increase in knowledge yielded excellent infection control practices (or=1.07) (p=0.046). The characteristics of age, gender, ethnic groups, levels of study, knowledge and practice were found to be statistically significantly associated with attitude at 0.1 level of significance (Galane, 2012).
Ethnic groups and levels of study (BDS4 & BDS5) were found to be significant predictors of attitude regarding HIV-positive patients (p=0.001) (BDS4, p=0.055) (BDS5, p=0.001). Non-black dental students had a negative attitude towards HIV/AIDS positive patients (or=0.89) (p=0.001). Attitude was found to be a significant predictor of practice (p=0.012) (Galane, 2012). This current study did not take race and social background into consideration, there was no statistical difference of knowledge levels between genders, however an increase in knowledge levels did result in a more negative attitude.

5.5 Comparison of KA (knowledge& attitude) between Pre-Clinical and Clinical students

Few published studies have compared the knowledge, attitude and infection control practices of dental students, between pre-clinical and clinical students. (Table 6&7)

Ryalat et al, (2011) investigated the differences between pre-clinical and clinical dental students in terms of their knowledge and attitude levels. This study did not report on a knowledge score; however they did investigate the different categories of knowledge and

compare these among the two groups. They found that a majority (84.2%) of the clinical students were aware of "the individual carrying anti- HIV antibodies to be an HIV carrier, whereas among the pre-clinical students only 57.7% were aware of this ($p<0.001$). When compared to this current study, there was a statistically significant association between knowledge levels of the pre-clinical students and the clinical group. For instance, 51% of the pre-clinical students had good knowledge levels compared to two third (63%) of the clinical students. They also report that a higher proportion of clinical students (73.7%) compared to pre-clinical students (60.8%) thought that HIV patients should be treated at any dental facility with the same respect and dignity as other patients but after taking special precautionary measures (Ryalat et al, 2011).

When comparison is made to this current study, 78% pre-clinical students and 91% clinical students also agreed that HIV patients should be treated at any dental facility. This current study also, showed no statistically significant differences between pre-clinical and clinical students with respect to their attitudes about HIV/AID's patients attending Wits Oral Health Centre.

Shailee et al, (2013), found that the average percentage of correct knowledge responses was 76.8% in the clinical group and 59.8% in the pre-clinical group, this was statistically significant ($p=0.01$).When compared to this current study, there was a statistically significant association between knowledge levels of the pre-clinical students and the clinical group. For instance, 51% of the pre-clinical students had good knowledge levels compared to two third (63%) of the clinical students ($p=0.03$). Their results showed an overall score of 65.6% which was regarded as negative attitudes, when compared to this current study only 4 (3.7%) of the students had a negative attitude. There was no significant difference between the attitude of males (65.3%) and females (65.7%) , where as in this current study, a stratified analysis by gender revealed that among females there was a significant association between attitudes and groups ($p= 0.04$). However, a separate comparison frequencies of positive and negative attitudes showed that a lower percentage of male students had negative attitudes (71.7% vs. 94.1%) and that a higher percentage of male students had a more positive attitude (28.3% vs. 4.23%) than the female students($p<0.0001$) (Shailee et al, 2013).

Premadasa et al, (2015) assessed the knowledge of the four years of studies (1^{st} -4^{th}) year dental students with no actual comparison made between the pre-clinical and clinical group, reported a median score for students overall knowledge to be 39.5(67%, max possible 59). The knowledge levels in Year 4(42.5+-4.7), Year 3(44+-6.5) and Year 2(42+-5.8), were similar but significantly higher than in Year1 (33+-7.9; $p<0.01$), which is in agreement with this current study, that found a statistically significant association between knowledge levels of the pre-clinical students and the clinical group. For instance, 51% of the pre-clinical students had good knowledge levels compared to two third (63%) of the clinical students ($p=0.03$). The median attitude score was 14 out of 24, which was regarded as largely negative, with no significant differences within genders and years of study (Premadasa et al, 2015).

When compared to this current study a majority of the students had a positive attitude to treating patients with HIV/AIDS, 60 (55%).

Seacat et al, (2003) compared the knowledge and attitude between the dental and dental hygiene students and reported that the dentistry students answered significantly more correct answers in the knowledge category compared to the dental hygiene students ($p<0.000$). Overall, the knowledge scores of the dentistry students were significantly higher than the scores of the dental hygiene students (4.42 vs. 3.70; $p=0.000$) (Seacat et al, 2003).

This was in contrast to this current study, which found that the dental hygiene students had a higher knowledge score when compared to the dentistry students, although not statistically significant (61 % vs. 59%). With regards to attitude levels, Seacat et al, (2003) found that there was no significant difference in attitude between the dentistry and dental hygiene students. This was similar to this current study, which found that the oral hygiene students had a more positive attitude compared to dentistry students when treating patients with HIV/AIDS, although not statistically significant.(44% vs. 47%), where the lower score was interpreted as a more positive attitude (Seacat et al, 2003).

Despite the same or slightly modified study instruments being utilised in some of the above studies, this study has found unique results in comparison. To explain some possible reasons for this disparity, we could look at the sample size used in different settings, the cultural and religious beliefs. The prevalence of disease in a particular setting and exposure time to patients

that may present with the disease and the confidence levels of the students being assessed could all be contributing factors to the differences evident in the above mentioned studies. Racial and gender disparity could also be a major influence by the pre-conceived ideas that may exist among specific demographic groups. Most likely, the stigma attached to contracting the disease, social interaction and fear that the individuals may have in treating these patients, also have an impact on the results of the study. The only one study that found the same result when investigating the correlation between knowledge and attitude was Ellepolla et al, (2011) where the dental students in Kuwait was assessed. Kuwait is a small Middle Eastern country with unique culture and values which may have had impact on attitude and perceptions about HIV/AIDS, when compared to South Africa which is composed of a variety and diversity of religious background, cultural and socio-economic disparities. The adult prevalence of HIV/AIDS in Kuwait is minimal; 0.12% (in 2001) and the number of people (adults and children) in Kuwait as of 2007 was estimated to be less than 1000 as compared to that of South Africa's, 6.3 million of the global disease burden (WHO, 2014).

In the Kuwait study (Ellepolla et al, 2011), only the clinical students formed the study sample (n=55), which was almost half the amount of the total sample used in this current study.

In summary, we can deduce that there is a common factor found among all the cultures mentioned above; the discrimination and stigmatization regarding HIV/AIDS exists among all cultures mentioned above. The shying away from issues that discuss any form of sexuality or education regarding this, may have contributed to the negative attitudes of these younger people, it may have even contributed a great deal to the large numbers of people living with HIV/AIDS. Society needs to be open and transparent regarding facts of reality and government policies need to promote education to these communities, specifically those that are of a conservative nature.

5.6 Limitations of the study

- Cross- sectional design – may affect the results as this survey is administered at one point in time.
- Information bias- there is a possibility that students may not give their true opinion of their feelings toward patients with HIV/AIDS. They may just choose an answer that they would think is expected of them.
- As mentioned in the previous Methodology section (Chapter 3), the assessing of practice levels was in the form of questions and this was not an ideal form of assessing. This should have been assessed by observing their practices of infection control. Some reasons that prevented this from happening was time constraints in order to observe each student. This is regarded as a limitation of this study and perhaps future studies of this nature can be conducted that will observe clinical practices of the students.

5.7 Conclusions

The average knowledge of students was 55% with just over half, 60(55.56%) of the students having a positive attitude. The infection control practices were of a good quality among the clinical students.

An increased level of knowledge resulted in more negative attitudes of students toward HIV/AIDS patients.

The knowledge levels of the clinical students were significantly higher than the pre-clinical group. There was a statistically significant association between knowledge level of the pre-clinical students and the clinical group. However, the study showed no statistically significant difference between pre-clinical and clinical students with respect to their attitudes about HIV/AID's patients attending Wits Oral Health Centre.

5.8 Recommendations

- The curriculum for dental students' needs to be appropriately modified where students will have a greater exposure to patients with HIV/AIDS, where they interact with and socialise with them. In our setting, the department of Community Dentistry has a programme in the Paediatric Virology ward at Charlotte Maxeke Hospital where some of our students are exposed to.

- A program should be introduced where the students volunteer their time to serving this population and should there be any students with negative attitudes, it may be modified to that of feeling morally obligated to treat these patients (Premadasa et al, 2015).

- Existing learning activities and practical skills should be adapted to ensure future dental practitioners have the clinical competence by exposing students to more clinical cases in the oral medicine and periodontology sessions, in combination with relevant knowledge to provide excellent and appropriate care to patients with HIV/AIDS or any other common transmissible diseases (Premadasa et al, 2015).

- Such modifications may assist re-enforcing desirable ethical values and more positive attitudes when treating these patients (Premadasa et al, 2015).

- According to the International Guidelines on HIV/AIDS and Human Rights, Guideline 8 stipulates that, "States should support the establishment and sustainability of community associations comprising members of different vulnerable groups for peer education, empowerment, positive behavioural change and social support"

  (UNAIDS, 2006)

(b) States should support the development of adequate, accessible and effective HIV-related prevention and care education, information and services by and for vulnerable communities and should actively involve such communities in the design and implementation of these programmes.

(c) States should support the establishment of national and local forums to examine the impact of the HIV epidemic on women. They should be multisectoral to include

Government, professional, religious and community representation and leadership and examine issues such as:

(i) The role of women at home and in public life;

(ii) The sexual and reproductive rights of women and men, including women's ability to negotiate safer sex and make reproductive choices;

(iii) Strategies for increasing educational and economic opportunities for women;

(iv) Sensitizing service deliverers and improving health care and social support services for women; and

(v) The impact of religious and cultural traditions on women (UNAIDS, 2006)

States should take measures to reduce the vulnerability, stigmatization and discrimination that surround HIV and promote a supportive and enabling environment by addressing underlying prejudices and inequalities within societies and a social environment conducive to positive behaviour change. An essential part of this enabling environment involves the empowerment of women, youth and other vulnerable groups to deal with HIV by taking measures to improve their social and legal status, involving them in the design and implementation of programmes and assisting them to mobilize their communities. The vulnerability of some groups is due to their limited access to resources, information, education and lack of autonomy. Special programmes and measures should be designed to increase access. In many countries, community-based organizations and NGOs have already begun the process of creating a supportive and enabling environment in their response to the HIV epidemic. Governments must recognize these efforts and lend moral, legal, financial and political support to strengthen them (UNAIDS, 2006).

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APPENDIX I: Information sheet for the participants

Good day to you Dear Student

I would like to invite you to participate in this study entitled, 'The knowledge, attitude and infection control practices of dental students when managing HIV/AIDS patients" at this University. The above will be assessed and your permission is requested to conduct this research.

What is the purpose of the study?

To determine the knowledge, attitude and infection control practices of the dental students when managing HIV/AIDS patients at the University of Witwatersrand.

What does the study entail?

Each student will be given a questionnaire in an enclosed envelope. Participation is voluntary and totally anonymous. All dental students from the 1st year to the final year will be invited to participate.

Benefits:

The study will enable the coordinators, managers and heads of departments to assess and re-evaluate the curriculum and courses taught to the students and make adjustments where necessary.

Reimbursements

There will be no compensation for participating in the study.

Confidentiality,

Please be informed that you will not be forced to participate in this study. Each questionnaire will be encoded with a special number, which will be known only to the researcher. Students,

who choose not to participate in this study, will be requested to place these questionnaires in an envelope and place in a separate pile, as requested by the researcher. Also, none of your personal details will be recorded.

Organizations that may inspect and/or copy our research records for quality assurance and data analysis include groups such as the Research Ethics Committee.

Please indicate your agreement to participate in this study:

YES: **NO:**

Sign:……

Contact details:

If you have any queries or would like more information about the study please contact Ms.Z.M.S Joosab at the Department of Community Dentistry, University of Witwatersrand on (011)717-2631.E-mail: Zorayda.joosab@wits.ac.za

For reporting of complaints / problems, you are welcome to contact the Chairperson of the Wits Research Ethics Committee, Prof P Cleaton -Jones through his secretary :

to Ms Zanele Ndlovu, 011 717 2700/ 1252/1234, Zanele.ndlovu@wits.ac.za or Mr Langutani Masingi 011 717 2656/ 1234 , langutani.masingi@wits.ac.za

Your cooperation in this regard will be appreciated

……..

Ms.Z.M.S Joosab

APPENDIX II: Ethical clearance

R14/49 Ms Zorayda Joosab

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M150609

NAME: (Principal Investigator)	Ms Zorayda Joosab
DEPARTMENT:	Community Dentistry School of Oral Health Sciences
PROJECT TITLE:	Knowledge,Attitudes and Infection Control Practices of Dental Students Toward Patients with HIV/AIDS
DATE CONSIDERED:	26/06/2015
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Veerasamy Yengopal
APPROVED BY:	Professor A Woodiwiss, Co-Chairperson, HREC (Medical)
DATE OF APPROVAL:	07/08/2015

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.
I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**.

Principal Investigator Signature _____ Date _____

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX III: Permission granted by the Head of Dental School

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

WITS Oral Health Centre
Private Bag X15, BRAAMFONTEIN, 2017
Enquiries: Ms ME Huygen
Tel: 011 717 2130
Fax: 086 765 4436
e-mail: Liza.Huygen@wits.ac.za

October 5, 2015

Ms ZMS Joosab
School of Oral Health Sciences
University of the Witwatersrand
Johannesburg

Regarding: "Knowledge, attitudes and infection control practices of dental students towards patients with HIV/Aids."

Reference: HREC/OCT2015/02

It is my pleasure to grant final approval to conduct a voluntary survey at the Wits Oral Health Centre in order to conduct your research with the above title. The Hospital Research and Ethics Committee allocated a unique reference number to this application - Kindly quote this reference number in all future correspondence regarding this research topic.

Please note that the Hospital Research and Ethics Committee should be informed of the estimated date the research will commence, as well as regular status reports until the research have been concluded. Within a month after conclusion of the research project, a written report must be submitted to the Head of School / CEO, summarizing the final results / outcome as well as recommendations made based on the research conducted.

Regards,

Prof P Hlongwa
CEO / Head of School

APPENDIX IV: Permission granted by the Dean of students

Faculty of Health Sciences (Office of Student Support)

The Phillip Tobias Health Sciences Building, 29 Princess of Wales Street, Parktown 2193, South Africa
• Tel: +27 11 717-2000 • Fax: +27 11 643-4318 • Telegrams: 'Witsmed'

04 July 2015

TO: Ms Zorayda Joosab
School of Oral Health Sciences

Protocol No: M150609

Dear Ms Zorayda Joosab

RE: **RESEARCH PROJECT ENTITLED** – *"Knowledge, Attitudes and Infection Control Practices of Dental Students towards Patients with HIV/AIDS".*

I have reviewed your research protocol & questionnaire and permission is hereby granted for you to proceed with the research.

PLEASE NOTE: that permission has been granted subject to the following conditions:

1. Anonymity of participants secured and participants to take part in the study on a purely voluntary basis.
2. Consideration and approval of the proposal by the Ethics Committee.

Yours sincerely

Professor T Parbhoo
ASSISTANT DEAN (Student Support)
Faculty of Health Sciences
University of the Witwatersrand
JOHANNESBURG

APPENDIX V: The administered Questionnaire

Knowledge, Attitude and Infection control practices of dental students when managing patients with HIV/AIDS- QUESTIONNAIRE

Demographic information

Male: ☐

Female ☐

Age:……..

Year of Study:……..

Assessment of Knowledge

Please answer each question with a correct or incorrect answer (CIRCLE YOUR ANSWER). Please feel free to choose the "don't know" option, if you really do not know.

1. HIV/AIDS patients can contaminate dental workers.

a: Correct	b: Incorrect	c:Don'tknow

2. HIV/AIDS patients can be diagnosed with the identification of an oral manifestation.

a: Correct	b: Incorrect	c: Don't know

3. Needle-stick injury can transmit the HI virus.

a: Correct	b: Incorrect	c: Don't know

4. Saliva can be a vehicle for the transmission of AIDS.

a: Correct	b: Incorrect	c: Don't know

5. Infection control methods for Hepatitis B provide adequate protection against the transmission of the HI virus.

a: Correct	b: Incorrect	c: Don't know

6. There are special dental clinics that provide treatment to HIV/AIDS patients.

a: Correct	b: Incorrect	c: Don't know

7. All sterilization methods have cidal effects against HIV.

a: Correct	b: Incorrect	c: Don't know

8. HIV can be transmitted through aerosols by hand pieces.

a: Correct	b: Incorrect	c: Don't know

9. Oral candidiasis is associated with HIV Infection.

a: Correct	b: Incorrect	c: Don't know

10. Salivary gland enlargement is associated with a patient infected with HIV.

a: Correct	b: Incorrect	c: Don't know

Assessment of Attitude:

Please circle the most correct answer: Only one option may be chosen. Please answer as honest as possible, you will be providing valuable data for the researcher.

a: Strongly Agree b: Agree, c: Neutral, d: Disagree, e: Strongly Disagree

1. It is my moral and professional responsibility to treat patients with HIV/AIDS.

a:	b:	c:	d:	e:

2. Treatment of HIV/AIDS patients means wasting national resources.

a:	b:	c:	d:	e:

3. I will deliver emergency care to patients with HIV/AIDS should the need arise.

a:	b:	c:	d:	e:

4. HIV/AIDS patients should be treated at a separate ward.

a:	b:	c:	d:	e:

5. Dentists with HIV/AIDS should not be allowed to practice.

a:	b:	c:	d:	e:

6. Dental practitioners have a right to know their patients HIV infection status.

a:	b:	c:	d:	e:

7. A blood test should be taken for diagnosis of HIV in all dental patients.

a:	b:	c:	d:	e:

8. I am afraid and uncomfortable to treat a patient once I have been told of their HIV status.

a:	b:	c:	d:	e:

9. Supporting HIV/AIDS patients improves community health.

a:	b:	c:	d:	e:

10. The risk of HIV contagion is high; therefore special precautions need to be taken to manage patients with HIV/AIDS.

a:	b:	c:	d:	e:

Assessment of Practices

This section should only be completed by students in the clinical years of the program. This would mean that only BDS 3,4&5& BOH II& III need to complete this section.

Please circle the most correct answer: Only one option may be chosen. Please feel free to choose the "don't know" option, if you really do not know.

1. Which methods of sterilization of instruments should potentially destroy the HIV virus:
   a: Boiling
   b: Cold sterilizing agent
   c: Autoclaving
   d: a&c
   e: All the above
   f: I do not know

2. Method of universal precautions include usage of:
   a: gloves and mask
   b: gloves only
   c: Gloves, mask, protective gown and eye-barrier
   d: I do not know

3. Universal precautions/ barriers are observed for:
   a: some patients
   b: all patients
   c: Patients whom I suspect may be HIV infected
   d: I do not know

4. When a patient divulges their HIV status, do you:
   a: Remain calm and continue treating the patient as you would normally treat and manage any other patient
   b: Get nervous and refer the patient to a colleague/ more experienced clinician.
   c: Become upset and refuse/ delay treatment of the patient
   d: I do not know